



COAL AGE



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The Peril

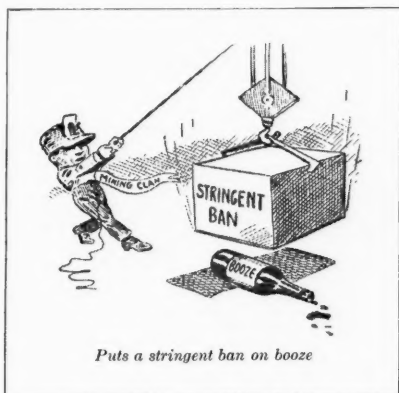
IT'S a hazardous undertaking,
This probing the depths for coal,
And the risks that lurk in the inky murk
Strike fear to the bravest soul;
For a miner may guide his actions
By the strictest of safety's creeds,
Yet be stricken low by a luckless blow
Through another man's misdeeds.



In a half a wink he must plan and think

WHEN a danger leaps out upon
him
As swift as a flash of light,
In a half a wink he must plan and
think,
And he's got to do it right;
Then his muscles must do his bidding
And his mind must be clear to
choose;
But he's sure to fail if they've both
gone stale
In the deadening grip of booze.

IT'S a murderous combination,
Is the mixing of booze and brain,
Which, as sure as fate, either soon or
late,
Brings calamities in its train;
For a miner who grows so groggy
That he doesn't know up from
down
Can raise more hell than a lyddite
shell
Dropped into a busy town.



Puts a stringent ban on booze

IN the running of railway systems
Old Alcohol stands accursed,
And he has no place in this year of grace,
When the slogan is "Safety First!"
So the chances are all for gaining,
And there's nothing at all to lose,
If the mining clan puts a stringent ban
On the fellow who clings to booze.

Written Especially for COAL AGE by Michael Bernard

Determination of the Equipment for Mine Locomotives

By GRAHAM BRIGHT*

SYNOPSIS—After the weight of a locomotive has been determined, the motors, control equipment, resistance and brake mechanism require careful attention. Motors should be so chosen that dangerous heating will not develop under normal conditions.

In order to determine the proper equipment for a mine locomotive it is necessary to have the following information:

Plan and profile of the road.
Number of cars to be handled per trip.
Number of cars to be handled per hour.
Weight of empty cars.
Length of cars.
Weight of load.
Frictional resistance of cars.
Time of layover, including switching and making up trip.
Voltage of circuit.
Gage of track.
Weight of rail.
Radius and length of minimum curve.
Spread of track on minimum curve.
Limiting dimensions which locomotive can have.
Position and range of trolley wire.

It is seldom that all of the above information can be obtained, and in many cases it is necessary to make certain assumptions to supply the missing data. This can

the other, due to better design and the proper distribution of the losses. A poorly ventilated motor will in some cases have "hot spots," and since "a chain is no stronger than its weakest link," these hot spots will lower the capacity of the machine. This is due to the fact that, in order to keep these spots within a safe temperature rise, the average temperature of the windings must be kept much lower than would be necessary if such spots were eliminated by proper design.

That the real capacity of a motor is its continuous capacity for all-day service and not the rating for one hour is apparently not generally appreciated among mine operators. The one-hour rating depends largely upon the thermal capacity of the motor, while the continuous rating depends on the ventilation, distribution of the losses and the capacity of the machine to radiate heat.

The one-hour capacity is not a fair rating of a motor for the foregoing reason and also because the speed of the motor is not taken into account. A fairer way would be to rate the machine on the pounds tractive effort at the wheels, irrespective of the speed, provided it is not considered essential for commercial reasons to capitalize the increased horsepower ratings due to increase in speed.



FIG. 1. A HEAVY MINE LOCOMOTIVE WITH THREE MOTORS AND THREE SETS OF DRIVERS

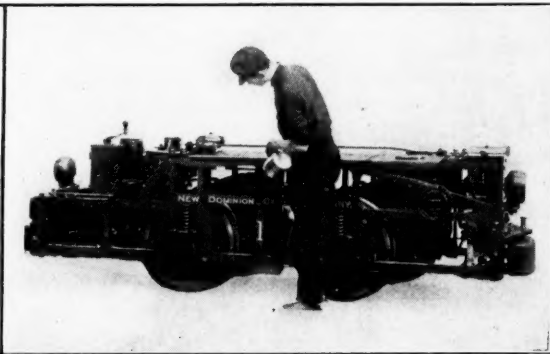


FIG. 2. A LOCOMOTIVE WITH BAR-STEEL FRAME FACILITATING VENTILATION

only be done by one having considerable experience in working out mining problems.

Motors for mine locomotives are rated on the one-hour basis with a 75-deg. C. rise in temperature. This rating does not indicate the capacity of the motor for all-day service, and is not used in determining its ability to meet with a certain set of conditions.

The capacity of a motor for all-day service depends upon the temperature which the windings will attain. This in turn depends upon the average heating value of the current. Since the heat generated by an electric current is proportional to the square of the current value, the average heating for all-day service must depend upon the square root of the mean square of the current.

Two motors may have the same one-hour rating, but one may have a much larger continuous capacity than

If the length of haul, the grade, curve, running time and time of layover are known, the current for each part of the run can be computed. In most main-haulage cases the locomotive will have a definite cycle to go through, this cycle being repeated throughout the working day. If the square root of the mean square current for one cycle can be found, this will, of course, determine the suitability of the motor selected for the all-day service as regards heating capacity.

MOTORS ARE SELECTED TO SUIT THE WEIGHT OF THE LOCOMOTIVE

After the locomotive weight is determined, the motor equipment is selected. By means of the motor curve the current and speed can be obtained for each part of the cycle. Each current value is then squared and multiplied by the time that it lasts. By adding these time-current-squared values and dividing by the total time, including

*Engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Penn.

layover, the average squared value of the current is obtained. The square root of this quantity will give the root mean squared value of the current for a complete cycle. If the continuous capacity of the motor is above the root mean squared value the machine is of sufficient capacity; if below, it is not large enough and a larger motor should be selected.

The continuous-current capacity of mine motors is generally given at two voltages. If the service is main haulage and the distances traversed are fairly long with good line voltage, the value at the higher potential should be used. If the service is gathering and switching or if the line voltage is poor, the value at the lower pressure should be employed. The increased iron loss of the motor at the higher voltage is responsible for the lower current capacity.

When the locomotive is accelerating, the current is considerably greater than when running at constant speed. This, together with the switching and making up of trips at the ends of the run, produces extra heating, and

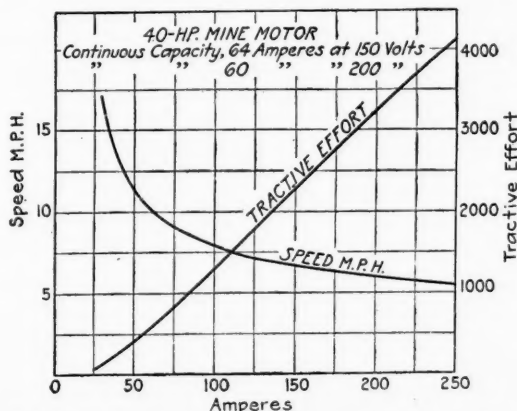


FIG. 3. CHARACTERISTIC CURVES OF A 40-HP. MINE LOCOMOTIVE MOTOR

actual calculations show that this can be allowed for by adding 10 per cent. to the sum of the time-current-squared values for fairly long runs and 15 per cent. for short runs. The exact heating value of the accelerating currents can be calculated closely, but as a rule this is not necessary and can be taken care of by the above method of adding from 10 to 15 per cent. to the time-current-squared values.

Since the actual all-day capacity of a mine motor is determined by its ability to get rid of heat by radiation and convection, any construction that will facilitate the ventilation of the machine will add to the all-day capacity. In the past, nine locomotives have as a rule been built with box-type frames of cast iron, rolled steel or structural steel. In all cases the frame was really an inverted box closed at the top and sides and nearly closed at the ends.

As considerable heat is generated by the motors, resistance grids and brake shoes, the temperature of the air around the motor will become considerably higher than the outside atmosphere. Where much sand is used the air inside of the frame will be constantly full of grit which will work its way into the bearings.

One of the recent improvements in locomotives is the "bar-steel" type of frame, which is an open frame made of steel casting. This frame being open on the sides permits of free circulation of air across the motors and resistance. This will increase the capacity of the equip-

ment, since the rise in temperature will be much lessened by this ventilation.

There are a number of other features about the "bar-steel" frame that make it desirable. The amount of inspection and attention a locomotive receives depends largely upon the accessibility of its parts. This type of frame lends itself admirably to this feature by providing ample openings through which inspection and repairs can be made. This frame can be made amply strong to meet the severe conditions that exist in mines, and in event of a collision it may be bent; it has never been broken. A bent frame can be easily straightened by a blacksmith.

AN ASSUMED CASE

To illustrate the working out of the above principles, the following conditions may be assumed to exist at a mine which desires to install electric haulage:

Locomotive required	1
Profile as follows:	
1300 ft. 2 per cent. grade against load.	
1400 ft. 1 per cent. grade against load.	
2200 ft. level.	
Number of cars to be handled per trip...	20
Number of cars to be handled per hour...	50
Weight of empty car.....	2000 lb.
Weight of load.....	4500 lb.
Total weight of loaded car.....	6500 lb.
Frictional resistance of cars.....	30 lb. per ton
Time of layover, including switching and making up trip.....	5 min. each end
Voltage of circuit.....	250
Gage of track.....	36 in.
Weight of rail.....	30 lb. per yd.
Radius of minimum curve.....	25 ft.
Length of minimum curve.....	20 ft.
Spread of gage on curve.....	¼ in.
Limiting dimensions of locomotive, 5 ft. wide, 4 ft. high.	
Trolley wire 6 in. outside of rail; height above rail, 4 ft.	
6 in. to 6 ft.	

The total weight of the trip will be 65 tons.

The limiting condition in regard to weight is, of course, on the 2 per cent. grade. The weight of the locomotive will be found as follows, applying the formula given in COAL AGE of Mar. 6, 1915:

$$30 \times 65 + 20 \times 2 \times 65 + 20 \times 2 \times W = 400 W$$

$W = 12.6$ tons if cast-iron wheels are used;

$W = 9.88$ tons if steel wheels are used.

It would, therefore, be necessary to use a 13-ton locomotive with cast-iron wheels or a 10-ton locomotive with steel wheels. Steel wheels should be used unless the customer specifies cast iron. A locomotive to negotiate a 25-ft. curve should have a wheel base not more than 55 in. with 33-in. wheels or 65 in. with 30-in. wheels. With motors tandem hung no trouble will be experienced in keeping below 55 in. or 65 in. for a 10-ton locomotive.

The number of cars to be handled per hour being 50, the trips per hour will be $50 \div 20 = 2\frac{1}{2}$. The total time per trip, including layover at each end, will therefore be $60 \div 2\frac{1}{2} = 24$ min. Allowing 5 min. layover at each end will make the actual running time 14 min.

For a locomotive of a given weight there are, as a rule, two or more motors to choose from. For a 10-ton machine these motors range from 40 to 50 hp. in capacity, although larger ones are sometimes required for special cases. A 40-hp. motor is selected for the first trial. The locomotive will have 30-in. wheels with a gear ratio of 4.78 to 1. The highest gear reduction is always selected unless a greater speed is required and can be obtained without overloading the motors. The characteristics of this motor are shown by the curves in Fig. 3.

This curve is made from an actual test, and the tractive effort given includes gear losses, so that to obtain the draw-bar pull only the locomotive friction should be deducted. A table of data covering the case, such as shown

in Table 1 or 2, should be prepared, the values inserted being calculated from the motor curves and weights to be handled. Since the curves give values for one motor, the locomotive and trailing weight should be divided by two to give the weight each motor will be required to handle.

TABLE I

Speed Miles per Hr.	Amp.	Total Tr. Eff.	Loco. Res.	Train Res.	Grade Res.	Dis- tance, Ft.	Time, Sec.	Amp. ²	Amp. ² × Time
8.5	87	1050	75	975	0	2200	177	7,569	1,340,000
6.5	165	2550	75	975	1500	1300	136	27,225	3,700,000
7.2	125	1800	75	975	750	1400	133	15,625	2,080,000
Returning with Empty Trip									
10	25	75	75	300	-300	1400	96	625	60,000
10	0	-225	75	300	-600	1300	89		
10	45	375	75	300	0	2200	150	2,025	303,000
Amp. ² × time =									7,483,000
Plus 10% for accelerating, switching, etc.									748,300
Total amp. ² × time									8,231,300
Total running time, sec.								781	
Total time at both ends, sec.								659	
Total time including layover, sec.								1440	
8,231,300 ÷ 1440 = 5700 = mean squared current.									
The square root of 5700 = 75.5 = square root of mean square current.									
Capacity of 40-hp. motor is 60 amp.									

THE WEIGHTS PER MOTOR ARE FOUND

For the above project the weight of locomotive is five tons per motor; the loaded trailing weight, 32½ tons per motor, and the light trailing weight, 10 tons per motor. Assume that the locomotive starts with a load on a level track and runs 2200 ft., when it encounters a 2 per cent. grade. After ascending this grade for 1300 ft. the grade changes to 1 per cent. for 1400 ft. The return trip will be with empty cars.

Starting with the loaded trip on the level, the locomotive resistance per motor will be $5 \times 15 = 75$ lb. This value is placed under "locomotive resistance" in the table. The train resistance will be $32.5 \times 30 = 975$ lb. The grade resistance will be zero. The total tractive effort will be 1050 lb.

Consulting the motor curves of Fig. 3 the current for a tractive effort of 1050 lb. is 87 amp. and the speed 8.5 miles per hour. The time to cover 2200 ft. at 8.5 miles per hour will be 177 sec. The amperes squared will be 7569 and the amperes squared multiplied by time will be 1,340,000. These values should be recorded in their proper place in the table.

When the 2 per cent. grade is reached, the train and locomotive resistance will remain the same, while the grade resistance will be $40 \times (32.5 + 5) = 1500$ lb. The total tractive effort will be 2550 lb., which corresponds to a motor current of 165 amp. and a speed of 6.5 miles per hour. At this speed it will require 143 sec. to travel 1300 ft. By the same process the values for the 1 per cent. grade are calculated and filled in the table.

On the return trip with the empty cars the locomotive resistance will be the same, the train resistance 300 lb. for 10 tons, and the down-grade resistance -300 lb. for the 1 per cent. and -600 lb. for the 2 per cent. grade. It will be noted that, running down the 2 per cent. grade, the net tractive effort is -225 lb., which means that the brakes must be applied in descending this grade.

TEN MILES PER HOUR WILL PROBABLY NOT BE EXCEEDED

On the 1 per cent. grade and on the level the speeds shown on the curve of Fig. 3 are too high for most mines unless the track is in good shape. It is likely that the operator will not care to run faster than 10 miles per hour, which he can do by operating the motors in series

on low notches, or by cutting off the power and coasting before the speed becomes too high.

The total running time is 781 sec., or 13 min. 1 sec. The actual running time will be close to 14 min., due to time taken to start and stop the trip and for possible slowing down at cross-overs. As the total time for a round trip is 24 min., a layover of five minutes is obtained at each end.

The product of the total current squared by the time is 7,483,000. To this, 10 per cent. should be added to allow for acceleration and switching when making up trips, making a total of 8,231,300. The total time for making a round trip, including layover, is 1440 sec. Dividing 8,231,300 by 1440 = 5700 as the mean square of the current. The square root of 5700 is 75.5 amp., which is the square root of the mean square current for one trip or cycle.

The continuous capacity of the motor is 68 amp. at 150 volts and 64 amp. at 200 volts. The class of service is such that the average voltage applied to the motor will

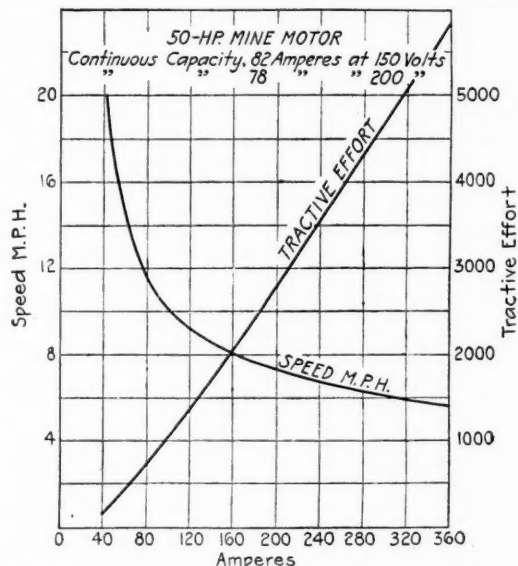


FIG. 4. CHARACTERISTIC CURVES OF A 50-HP. LOCOMOTIVE MOTOR

be near 200, so that the rating of the motor is about 65 amp., which shows that it is not of sufficient capacity for the service.

TABLE II

Speed Miles per Hr.	Amp.	Total Tr. Eff.	Loco. Res.	Train Res.	Grade Res.	Dis- tance, Ft.	Time, Sec.	Amp. ²	Amp. ² × Time
10.1	100	1050	75	975	0	2200	149	10,000	1,490,000
7.6	187	2550	75	975	1500	1300	117	34,970	4,090,000
8.5	146	1800	75	975	750	1400	113	21,316	2,410,000
Returning with Empty Trip									
10	35	75	75	300	-300	1400	96	1,225	117,500
10	0	-225	75	300	-600	1300	89		
10	56	375	75	300	0	2200	150	3,136	470,400
Amp. ² × time =									8,577,900
Plus 10% for accelerating, switching, etc.									857,790
Total amp. ² × time									9,435,690
Total running time, sec.								714	
Total time at both ends, sec.								726	
Total time including layover, sec.								1440	
9,435,690 ÷ 1440 = 6550 = mean squared current.									
The square root of 6550 = 81 = square root of mean square current.									
Capacity of 50 hp. motor is 80 amp. at 150 v.									

Care should be taken that a motor is not selected in which the commutating limit is exceeded when the wheels are slipped while using sand. The motor curves are generally stopped at the commutating limit, although

with the modern commutating-pole motor it is rather difficult to find the commutating limit.

A larger motor should be selected, and Table II shows the results of the calculation using two 50-hp. motors. The curves of Fig. 4 show the characteristics of this motor. The total calculated running time is 714 sec., or 11 min. 54 sec. The square root of the mean square current is found to be 80 amp. The capacity of the motor at 200 volts is 78 amp. and 82 amp. at 150 volts, so that this motor will be of just about the proper capacity to meet the conditions. The actual running time will be about 12 to 14 min., allowing 5 to 6 min. at each end for switching and making-up trips. The higher root mean square current obtained for the 50-hp. motor is due to the fact that it is a higher-speed machine than the 40-hp. This shows the importance of having a low-speed motor.

It is not safe to figure on a short layover, as in many cases the average line voltage is much less than 500 or 250 volts, which means that the speed will be less than is figured on. A low line voltage signifies that a given current will be required for a much longer time than with the normal voltage, which in turn means additional heating. Where the voltage is likely to be poor, a margin should be allowed in the motor capacity, since the value of the square root of mean square current will be greater than that calculated.

IN SOME MINES THE GRADES FAVOR THE LOADS

The conditions outlined above in regard to profile are typical of what may be expected in mines. Sometimes it is possible to lay out a mine so that all of the main haulage will be with the grades; other mines will have mixed grades—that is, some inclinations in favor of the load and some against it; while too often a mine will be found with little or no level track and all grades against the load. If the profile instead of that given above were 2 per cent. against load 300 ft., level track 2300 ft., 1 per cent. in favor of load 2300 ft., the same weight of locomotive would be required, but the heating would be much less. Table III shows that the root mean square current is only 51.7 amp., which gives a large margin of safety when using the 40-hp. motor.

TABLE III

TABLE III

Speed Miles per Hr.	Amp.	Total Tr. Eff.	Loco. Res.	Train Res.	Dis- Grade Res.	tance, Ft.	Time, Sec.	Amp. ²	Amp. ² × Time
6.5	165	2550	75	975	1500	300	31.5	27,225	870,000
10	40	300	75	975	—750	2300	157	1,600	251,200
8.5	87	1050	75	975	0	2300	184.5	7,569	1,395,000
Returning with Empty Trip									
10	45	375	75	300	0	2300	157	2,025	318,000
10	65	675	75	300	300	2300	157	4,225	664,000
10	0	—225	75	300	—600	300	20		
Amp. ² × time =								3,498,200	
Plus 10% for accelerating, switching, etc.								349,820	
Total amp. ² × time								3,848,020	
Total running time, sec.								707	
Total time at both ends, sec.								733	
Total time including layover, sec.								1440	
3,848,020 ÷ 1440 = 2670 = mean squared current.									
The square root of 2670 = 51.7 amp. = square root of mean square current.									

On the other hand, the grade may be 2 per cent. for the entire distance against the load. In this case the root mean square current would be about 105 amp., corresponding to a motor having an hour rating of 75 to 80 hp. As it would not be practical to put two such large motors on a well designed 10-ton locomotive, it would be necessary to go to a 12- or 13-ton machine.

When a locomotive is to be used for gathering it is dif-

ficult to determine the proper capacity by the above method, since the service consists largely of starting and stopping with varying loads. From experience it has been found that if the horsepower per ton of weight of locomotive ranges from 6 to 10, the motors will have ample capacity.

This scheme is much of a makeshift and has little real reason behind its use. Locomotives have been in successful operation for years with but 6 hp. per ton and the motors were not overloaded. On the other hand, cases sometimes arise where 12 to 14 hp. per ton would be entirely inadequate. A high horsepower per ton is often obtained by using a high-speed motor and either allowing the locomotive to run fast or to use a pinion which is entirely too small for safe operation.

The placing of too large an equipment on a locomotive is a detriment instead of an advantage. It is somewhat similar to hitching a heavy dray horse to a light express wagon. The horse cannot work up to anything like his capacity and is likely to injure the wagon in attempting to perform his normal work.

Where the motor is too large the speeds will be high and the motor-man is often tempted to use an excess of sand and to hold the brakes on during acceleration to prevent slipping. This kind of operation results not only in a rise in power consumption but also a large increase in mechanical wear. The saving in electrical repairs may be more than balanced by the increase in mechanical repairs.

When reels are desired they can be furnished either of the traction or electrical type. The traction reel is used where steep grades are encountered and it is not desirable to have the locomotive enter the rooms. The capacity of the motor for a traction reel should be from 4 to 8 hp., depending upon the conditions. A small resistance type of controller should be used.

Of electrical reels two general types are used—the mechanically and the electrically driven. The mechanically driven reel is geared to one of the axles or to one of the main gears. This reel has the disadvantage that if the wheels are locked by the brake when coming out of a room the cable will be run over and cut in two.

The electrically driven reel consists of a horizontal or vertical axle reel equipped with a small motor, which acts as an electrical spring, always keeping tension on the cable. The motor is generally less than 1 hp. in capacity and is so wound that it can remain connected across the line continuously without danger of being burned out. The horizontal reel has the advantage that it does not interfere with access to the main motor and can be mounted low down in front without increasing the height of the locomotive.

SELECTING THE CONTROL APPARATUS

The resistance type of controller is generally employed for mine locomotives. This controller contains a combination series-parallel and reversing switch so that the motors can be operated either in series or parallel. This controller has two advantages over the standard series-parallel type used for railway service in which the motors are always started in series—first, it is much shorter, which permits it to be used in an upright position on locomotives which must be built to a minimum height; second, it is often necessary to start in parallel, since a greater and more even draw-bar pull is thus obtained.

The reason for this is that when the motors are in series and one pair of wheels starts to slip, the counter electromotive force of the slipping motor rises and cuts down the current so that the other motor is robbed of a large portion of its torque. When in parallel each motor receives its current independent of the other and the slipping of one pair of wheels does not reduce the torque of the motor driving the other pair.

Controllers for mine locomotives are designed for 500-volt service, so that any given controller has twice the capacity in horsepower on 500 volts that it has on 250. Mine-locomotive equipment, like railway equipment, is becoming heavier each year and considerable difficulty is sometimes experienced in providing a controller to handle the heavy currents. Most of the controller trouble occurs when throwing the controller "off" while pulling heavy loads.

In railway practice this trouble has been taken care of by supplying an auxiliary switch, operated by compressed air or magnetically, to open the trolley circuit when the control hand starts to move to the "off" position. It would be necessary to use a magnetic contactor with a mine locomotive, since, with a few exceptions, mine locomotives are not equipped with compressed air.

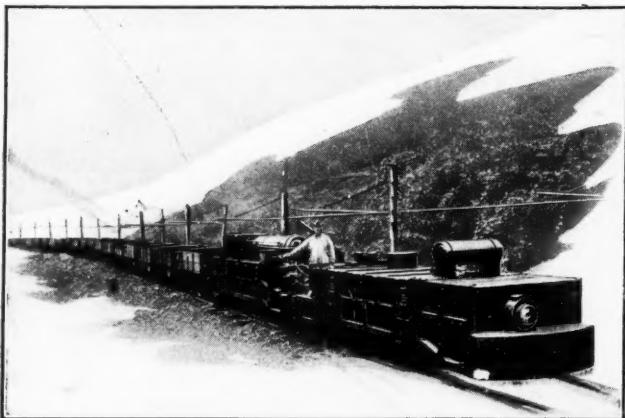


FIG. 5. TWO LOCOMOTIVES ARRANGED IN TANDEM FOR HEAVY HAULS

With a locomotive built for minimum height and width, some difficulty would be experienced in finding a suitable location for the contactor. This scheme will no doubt be tried out in the near future. At present, when the motorman thinks he may blow up his controller by throwing it off, he pulls down his trolley and breaks the arc on the trolley wheel.

Care should be taken in selecting the resistance that ample capacity is provided for the type of service to be met. An alloy grid has been found to be the most satisfactory, since straight cast iron is too brittle to stand the constant jarring and vibration incident to mine operation.

Sometimes continuous running on notches is specified. This will greatly increase the number of grids required, and where continuous operation is necessary on every notch the number of grids will be about doubled. In most cases it would be difficult to find room for so much resistance on a locomotive.

Gathering locomotives will require more capacity in resistance than main haulage units, since the number of starts in a given time is greater. It is, therefore, im-

portant to supply ample current-carrying capacity as well as the correct ohmic value in the resistance.

CIRCUIT-BREAKERS ARE SELDOM USED EXCEPT ON LARGE MACHINES

Circuit-breakers are, as a rule, used only on locomotives of 10 tons and over. Many large machines of 20 to 30 tons are, however, equipped with fuses, and in some cases no protection at all is provided. If a circuit-breaker is of ample capacity and is properly maintained it should give excellent service. Such a device should be set a little above the slipping point of the wheels so that it is not likely to open during the starting of a heavy trip. This setting should correspond to the current in both motors that will produce a tractive effort of about 40 per cent. of the weight on the drivers.

A fuse should be selected in the same way. The railway type of fuse box using an aluminum or copper wire or ribbon is preferable, since a motorman can always find a piece of wire of somewhere near the right size, while the likelihood of his having extra fuses of the inclosed type is not great.

Sometimes a locomotive is desired of such a capacity and weight that the rails will not safely carry it. In this case a tandem unit may be resorted to. This combination generally consists of a leading unit equipped with a four-motor controller and a trailing unit equipped with a two-motor controller. The locomotives are electrically connected by jumpers and mechanically through the draw bars and brake system.

This combination is arranged so that it can be separated and each unit operated independently of the other. The braking becomes a serious consideration when the units are large, and in some cases air brakes are resorted to. Fig. 5 illustrates two 15-ton units operating in tandem and using an air-brake equipment.

Another method of reducing the weight and horsepower per axle is to supply a three-motor locomotive. This renders possible a locomotive one-third larger without increasing the wheel load. The series position on the controller gives rather slow speed with all three motors in series, but heavy pulls can be obtained with a small expenditure of power. Fig. 1 illustrates a 24-ton locomotive equipped with three 85-hp. motors. Particular attention is called to the equalization scheme used on these locomotives. Two pairs of drivers are equalized on the sides, while the third pair is cross-equalized. This insures good tracking, especially at high speeds.

❧

Success

Articles of all descriptions and kinds are coming in for our April 3 SUCCESS number. Our readers located at different mines in various fields are picking up ideas covering practical installations and systems already being successfully used. In some cases large plants are described, while in other instances practical wrinkles of a saving nature are written about. It is this kind of co-operation that has made COAL AGE so very interesting, and we much appreciate such support on the part of our friends. It is not yet too late to send in your SUCCESS story; however, the time is growing short, and all those who have an article under way for this special number are urged to hurry along its completion.

Coal Washer for No. 8 Mine, Tennessee Coal, Iron & Railroad Co.

By O. H. BOHM*

SYNOPSIS—Some of the details of the crushing screening, picking and washing machinery are here described. This plant is peculiar in that a reversible picking table is employed.

The article by Mr. Butcher in COAL AGE under date of Feb. 20 prompts a few additional remarks regarding the installation mentioned. Too much praise can not be

To facilitate the handling of coal from other mines of the company, a foreign-coal track hopper and conveyor were installed at a point up the track from the tippie. This was for the purpose of utilizing the screening, crushing and washing facilities which were to be provided at the mine, either at night or in case an unforeseen accident at No. 8 mine might hamper operations at that point during the day. The coal from other points is delivered and stored on the tracks in large hopper-bottom

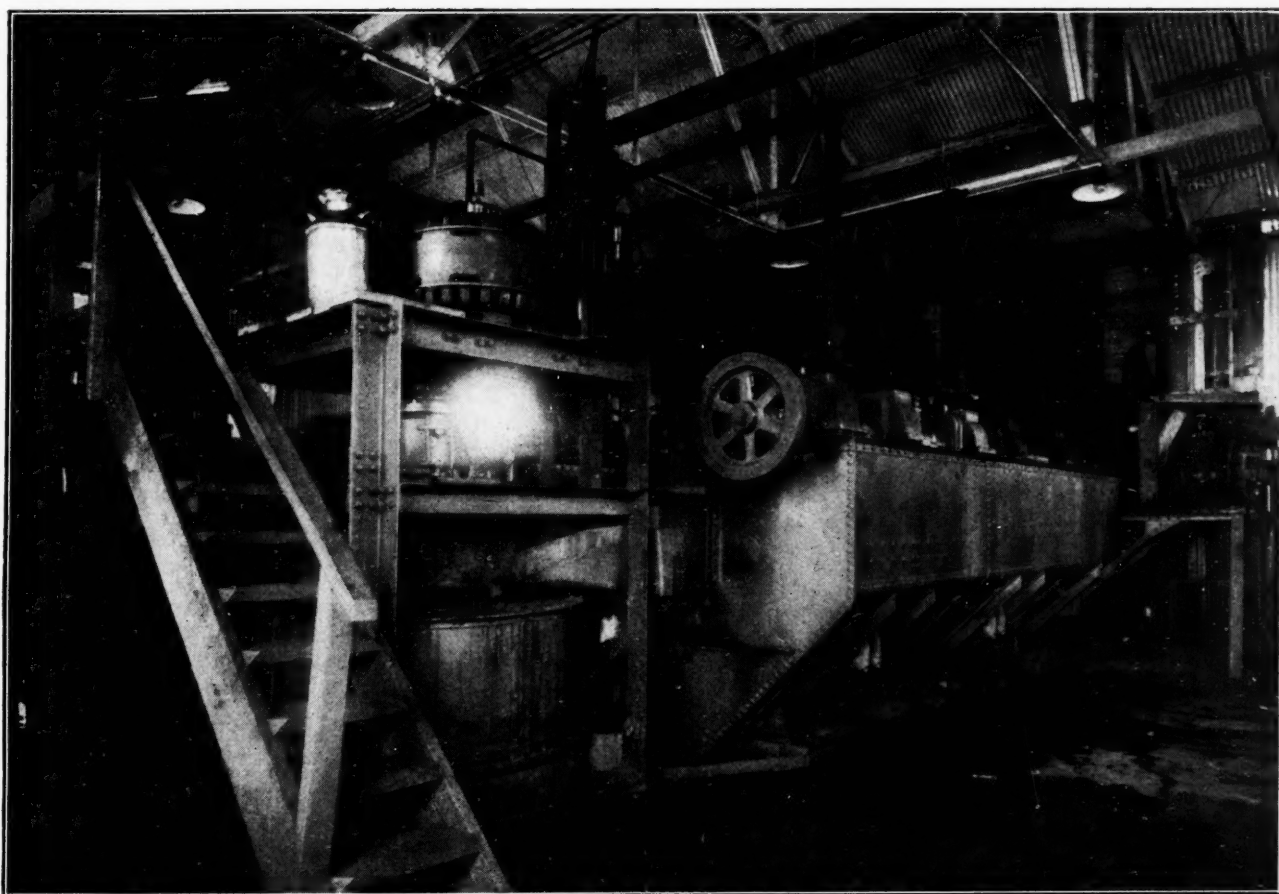


FIG. 1. INTERIOR OF WASHERY, SHOWING JIGS AND DRYERS

given Robert Hamilton, consulting engineer for the Tennessee Coal, Iron & R.R. Co., for the careful study which he made of general conditions surrounding the plant.

The coal is brought to the tippie and dumped onto shaking screens set lengthwise over the slack track. The undersize from the shaker may be dropped into a car beneath or spouted to the crushing plant. The oversize or lump coal is fed onto a reversible pan conveyor discharging to a railroad car on the lump track, the speed of the conveyor being such that hand picking is resorted to for the removal of occasional pieces of slate. Running in the opposite direction this conveyor discharges to the crushing plant.

*Mining engineer, Canton, Ohio.

cars. During operation this foreign-coal conveyor discharges onto the shaking screens, the coal being treated the same as the run-of-mine coal from No. 8.

The crushing plant was installed immediately under the tippie. It consists of one set of toothed rolls for primary reduction of the lump coal and feeding directly to a set of corrugated rolls for the final reduction of the slack product from the shakers, as well as that coming from the primary lump breaker. Both sets of crushers are of heavy design, with parts as nearly interchangeable as possible, and are supported on steel frames carried on walls surrounding the crushers.

To obviate crowding as well as wear and tear incident to an elevator of great height and also to secure capacity

sufficient to be able to keep the washing plant in better condition and independent from the tippie operations a belt conveyor was installed to carry the reduced product of the crushing plant to the raw-coal storage bin of 200 tons' capacity, which is located about 200 ft. from the tippie. This bin is placed at a sufficient elevation to feed direct to the jigs through special revolving feeders of wide face, it having been determined that an opening narrow vertically and wide horizontally would permit a more uniform flow of the fine coal than was otherwise possible. As two jigs of approximately 50 tons' hourly capacity each were intended, only two feeders were required, these being driven by chains from the jig shafts.



FIG. 2. CRUSHER AND INCLINED CONVEYOR BELT

It was decided that the jigs for the plant would consist of two direct-connected units, each consisting of three tandem sieves 6 ft. wide and 6 ft. long, with plungers on each side thereof. Each sieve was provided with rotary valves of special construction for the removal of slate, bone and boiler coal. The equipment operating these valves is of such design that great variations in speed and capacity are possible, while uniform products can be obtained from the bed of the jigs by their operation. The jig tanks are of steel, double hoppered, and provided with manholes in the bottom for the sake of accessibility, as well as gates for drawing off the product coming through the sieves.

To insure neatness and economy in the matter of lubrication and to reduce power consumption, ring oiling bearings with large oil reservoirs are used on the jig shafts throughout.

The plungers are approximately 3 ft. wide and 3 ft.

long, two being used on either side of each sieve. They are of steel construction, equipped with rubber flap valves, and each is actuated by its own eccentric. The reduction of the size of the plungers assures greater ease in handling as well as allowing a variation in stroke at the feed end of each compartment from what might be found necessary at the discharge end of the same.

The eccentrics of the jigs are of special design, adjustable from zero to 2-in. stroke and equipped with automatic oilers and traveling oil reservoirs. The yokes are of cast steel, bushed with brass at the connecting pin. No water or grit can enter the housings or come in contact with the eccentrics. This obviates much wear and tear and the incidental cost of frequent renewals.

The coal passes from the jigs to the driers direct, the water being removed for the purpose of settling out the slimes which are returned to the driers and entrained with the coal as described in Mr. Butcher's article mentioned above. The dried coal is collected on a conveyor underneath the driers and then elevated to a shipping bin of 300 tons' capacity. The refuse and boiler coal are handled in dewatering elevator pits and discharged to bins of 50 tons' capacity each.

The raw-coal, refuse and boiler-coal elevators are of heavy design to insure durability and are double strand throughout. The entire mechanical equipment was designed with high safety factors and with the idea of ample capacity in case a rush had to be handled, as well as economy in operation. Many of the devices used throughout the plant are of special design and protected by patents.

A few words regarding the materials entering into the buildings comprising the completed plant should be permissible here. The crushing plant is of concrete and steel, covered with corrugated iron. The conveyor gallery for the raw coal is also of steel with concrete floors. As the inclination of this gallery is 21 deg. the floors are provided with safety treads.

The washer building proper is concrete up to the washer floor, the superstructure being of steel covered with corrugated iron. The large settling cone mentioned in Mr. Butcher's article is also of steel. The raw-coal bin, as well as the washed-coal, boiler-coal, and refuse bins, are of timber construction throughout, lined with steel and provided with suitable gates for the discharge of materials. The washer building is amply provided with windows and is well ventilated, insuring good working conditions.

The performance of the plant from the standpoint of efficiency and economy has been previously mentioned. Its simplicity is one of its great redeeming features. The writer was identified in an engineering capacity with the design, construction and starting of the plant.

■

A Recognition of Deserving Service

No industry can boast bigger and better men than coal mining. There are a number among us who have labored faithfully and efficiently in the mining business, without any recognition other than that of a purely local nature. Pick out a man of this type and send us immediately a short story about him, including if possible a photo of the person himself. The man, his friends and family will much appreciate such a tribute to high character and superior ability. The article will go in our SUCCESS number and must be sent to us within three or four days.

The Labor Situation

SYNOPSIS—The eastern Ohio miners exhibit the firmest determination not to arbitrate or concede anything to the operators. A strike in eastern Kentucky is threatening, a cut of 20 per cent. having been made by the Middle Creek Coal Co.

The storm center is still Ohio. The union reluctantly finds that it cannot finance more than one such center; in fact the Ohio difficulty is a terrible strain on a limited purse. The union has already paid over \$1,380,000 in Ohio to the strikers, and the payments still being made amount to \$40,000 a week. In addition to these union contributions, 75 carloads of clothing, food and other supplies have been shipped in from the cities in which these goods were solicited.

Carried Almost Unanimously

But what can be done to end a strike where the men are such a unit in their determination! At the recent referendum 118 voted for arbitration and 14,280 against such action. Three small locals at Flushing, a large one at Crescent and a small one at Warnock, all in Belmont County favored arbitration by a small majority. But out of 79 locals, only the 5 mentioned voted for arbitration, 10 (which were working) did not vote, and 62 stood out for the 47c. basis. From two others the returns have not yet been received.

The operators declare that those men who were opposed to arbitration were the only persons notified of the proposed vote, but the number of votes cast, which is not far from 100 per cent. of the possible ballot, makes this complaint feeble. The sentiment is, of course, not so strong as the vote. Majorities tend always to unanimities. Few men wish to oppose their convictions to a strong body of contrary opinion.

The Operators Who Have Received Concessions Favor the Green Act

The Gallagher amendment to the Green anti-screen bill has been certified to the state house of representatives. It is now in the committee on mines and mining, and sentiment seems to favor its passage. The miners' leaders are starting a vigorous campaign through the state for the defeat of the amendment.

In order to prevent the miners from permitting any amendment to the Green Antiscreen Act, J. S. Jones, president of the Sunday Creek Co., which is one of the largest producers in the state of Ohio and has no mines in the eastern Ohio district has notified Percy Tetlow, the miners' legislative agent, that in case the house adopts the Gallagher amendment and it becomes law with the emergency clause attached, he will close down his mines unless his men will accept a reduction of 2.39c. on the wage scale adopted last August.

It is evident that the Sunday Creek Co. recognizes that the 47c. rate in the eastern Ohio field would be an increase of 2.39c. over the old screen rate. It realizes that such an increase gives the companies in other parts of the state an advantage, which it regards as already secured and which it desires not to lose by the repeal of legislation.

Rumored Defections of Operators

There appears to be considerable doubt as to the intentions of Arthur T. Morgan at the Edgehill mine. It is stated that no contract has been signed and that all the operations of the 15 men at this mine constitute merely cleaning work, such as was commenced some time ago at the Big Run and the Fort Pitt mines and was stopped later by the union.

Now the Blyth Coal Co., at Salt Run, is similarly reported to be about to sign a contract on the 47c. basis. It employs about 100 employees. C. J. Albasin, the president of the subdistrict, says that yet another coal company has asked for a form of contract.

To prove that the miners are supporting their leaders, the vote for president, vice-president and secretary-treasurer of the subdistrict in which the strike is centered may be quoted. C. J. Albasin, William Roy and William Applegarth who respectively filled the positions mentioned for the past term have been reelected, meeting absolutely no opposition, though the vote was not large, being only 6059 out of a membership of about 17,000.

The Eastern Kentucky Strife

The Middle Creek Coal Co., the largest concern in Floyd County, eastern Kentucky, has decided on a 20 per cent. reduction in wages. The Colonial Coal & Coke Co., the next largest operator in that county, has made the same reduction and a strike has resulted. The men in that district are mostly American and non-union. If, as has been expected,

other companies make an equal reduction in wages, a widespread strike may result.

An Agreement Sought in New River District

The directors of the New River Co., and the New River & Pocahontas Consolidated Coal Co. desired Thomas Haggerty and Joseph Vasey, members of the international executive board of the United Mine Workers to come to New York City for the purpose of discussing the terms of an agreement. The meetings at Cincinnati, Ohio, and Charleston, W. Va., had been a failure. The two labor leaders left Charleston on Mar. 9. The result of their deliberations has not been announced.

Convention in Arkansas

A convention is proposed in District 21, comprising Arkansas, Oklahoma and Texas. This convention is to consider the purchase of the Bache-Denman property. Five locals near Hartford have voted in favor of the purchase, and others are expected to do so shortly.

Several unions are voting to assess their members from 25 to 50c. per month for the benefit of the families of the men who were sent to jail in the government's conspiracy cases. The sentences imposed on these men were for violence and contempt of court arising out of the attempt of the Bache-Denman Coal Co. to run an open-shop mine.

An agreement has to be signed with the Blue Ridge Coal Co., which intends operating the mines of the old San Bois Coal Co., which had, as our readers will remember, a terrible explosion at its Chant mine, which appears to have been the cause of its troubles. This agreement will probably be elaborated at the convention proposed.

The Rocky Mountain Coal Mining Institute Will Hold Summer Meeting

The Rocky Mountain Coal Mining Institute will resume its meetings, holding the next one in Trinidad, Colo., June 8, 9 and 10, 1915. The following committees have been appointed: Program and entertainment—W. F. Murray, J. P. Thomas and M. O. Danford, all of Trinidad, Colo. Transportation—Wyoming, Frank Manley and P. J. Quealy; Utah, W. C. Ferguson and A. C. Watts; New Mexico, G. A. Kaseman and T. H. O'Brien; Colorado, W. J. Murray and C. W. Babcock. F. W. White-side, Denver, Colo., is secretary-treasurer.

Recent Legal Decisions

Scope of Mine Safety Law—A law, such as is in force in Missouri, making coal operators liable for injuries to employees, caused by negligence of coemployees, does not extend to men engaged in sinking prospect holes. (Kansas City Court of Appeals, Allen vs. Leach, 171 "Southwestern Reporter," 9.)

Personal Injury Verdict Not Excessive—Seven thousand three hundred and thirty-four dollars cannot be deemed excessive recovery for injury to a miner caused by a fall of slate, if he was thereby incapacitated for work through hardening of the muscles of his back, partial paralysis of his legs and disarrangement of his internal organs, he having previously earned \$4 or \$5 a day. (Kentucky Court of Appeals; New Bell Jellico Coal Co. vs. Sowders, 172 Southwestern Reporter, 914.)

Misunderstanding as to Price of Coal—When the parties to a contract for a sale of coal or other commodity really misunderstand the price at which the sale is made, the same not being expressed in writing, and the buyer receives and uses the property, after ascertaining from invoices that the seller claims a larger price than the buyer understood was fixed, he becomes liable for the invoice price, according to the decision of the Kentucky Court of Appeals, announced in the case of Caldwell & Drake vs. Cunningham, 172 "Southwestern Reporter," 498. Put where it appears that a certain price was mutually agreed upon, the buyer's acceptance of shipments under invoices calling for a higher price does not render the buyer liable for more than the contract price.

"A Statement of Facts" from the Operators of the Middle West

SYNOPSIS—The operators of Indiana and Illinois state that the present competitive system produces a series of public and private ills, and they advocate some manner of regulation, the nature of which, however, is not specified.

The coal operators of the States of Indiana and Illinois present herewith to the American nation some facts about the condition of their business. The normal state of the coal industry for some years has been such as to endanger the lives of the miners, to waste the coal reserve which now insures the continued prosperity of the eastern part of the country and to deprive these operators of any hope of profit. The recent general business depression has intensified this dangerous condition. The near future contains nothing but disaster unless some relief is extended. What follows summarizes the facts.

The coal produced in Illinois and Indiana sells in an interstate market embracing 18 states. For that reason, the operators who produce it are amenable to the anti-trust laws which, they believe, forbid any coöperation among them. Because they cannot coöperate, they cannot simplify their selling methods or reduce their selling and operating costs.

Their mines are within the two states mentioned and cannot be removed therefrom. These states will continue therefore to regulate their operating methods.

COST INCREASES WHILE PRICE DECLINES

The effect of the nation's anti-trust laws is to cause the operators to compete without restraint. This unrestricted competition has resulted in a decreasing selling price. On the other hand, the states' laws, which were enacted to assure the safety and the social welfare of the miners, have resulted in a rising production cost and in increased expenditures for equipment. In obedience to the states' laws, the mines have been fireproofed and expensive safety appliances have been added. These things have enlarged the requisite investment in plant and equipment by 1000 per cent. in the last 20 years.

The effects of these two sets of laws have moved in opposite directions. The rising cost of production and the falling selling price have long since made profit impossible and now threaten the integrity of the whole business structure as well as the safety of the miners and the welfare of the public.

One of the refinements of competition in which these operators have indulged has been the erection of elaborate plants with which to prepare and clean carefully nine standard sizes of coal.

Another effect of enforced competition has been intense individualism. In consequence, three mines have been opened where only two were needed, and three men have been employed where only two were necessary. These mines and men can find productive work only during 175 instead of a possible 300 days in a year.

THE MARGIN BETWEEN SELLING AND LABOR COSTS

Because the operators can give their miners work only a part of the time, these operators must pay higher daily

wages than are warranted by the current selling prices. Their labor cost is 92.44c. per ton, whereas the selling price is but \$1.14 and \$1.11 respectively for the States of Illinois and Indiana.

From the resulting narrow margin these operators must pay administrative salaries and expenses, selling cost, royalty or land-depletion charge, depreciation on plant and equipment, the cost of all materials used in the mines and some eight or ten other major items of expense. The margin is clearly wiped out by these expenditures, and thus the business is left with no possible net revenue.

Still, these operators are morally or legally obligated to pay the cost of any great or dire emergencies, to educate their miners in ways which will assure greater safety, to educate the users in methods by which coal can be burned with greater efficiency, to expand their sales into the foreign markets, to experiment with and undertake the manufacture of byproducts and to do those hundreds of little things which make for greater safety and for true conservation.

WASTE OF COAL

One obligation resting upon these operators is to recover the pillar and top coal that the loss to the country may be lessened. Because this involves an additional expense, it cannot be undertaken. Still, for every two acres of coal land which the operations exhaust they leave one acre of coal unrecovered and unrecoverable in the ground. This means that in Illinois each year 12,000 acres of coal land are exhausted, whereas the exhaustion should be but 8000 acres. In Indiana the depletion is 3000 acres, whereas it should not be more than 2000. In the whole country 100,000 acres are exhausted, whereas not more than 65,000 or 70,000 acres should have been thus made of no mineral value.

The operators of Illinois and Indiana, caught between the conflicting regulations of the states and the nation, yet under compulsion to obey both, are powerless to prevent this waste. Only the nation can reverse this tendency and provide against it. This statement is made in the hope that some suggestion will be made which will bring the relief needed.

PROSPERITY OF FARMERS AND MANUFACTURERS

It has been said that the normal condition of the coal-mining industry is one of dangerous financial exhaustion. Since the end of the depression in 1897 the farms and factories have enjoyed increasing prosperity. This has not been shared at any time or in any degree by the coal industry. Regardless of the regular and substantial annual increase in tonnage produced, the returns from investments in the coal trade have been steadily diminishing. Coal has supplied the power which made every business rich, yet the author of all this wealth remains poor.

In fact, in the last dozen years there have been but a few brief periods in which the coal trade has enjoyed any prosperity. These prevailed in each instance for not to exceed two or three months. They were due to wholly unnatural causes and in no manner indicated that the business had, at last, become master in its own house.

For example, the operators of Illinois and Indiana received remunerative prices during the anthracite strike of 1902 when they profited by the misfortunes of others. For short periods during car shortage in the winters of 1903 and 1904, this experience was duplicated. Once or twice since that time, strikes or other temporary labor difficulties in one state gave the other states business to which they had no natural right. Except in such times, the trade has been unprofitable or actually showed a loss.

WHY COSTS OF PRODUCTION HAVE RISEN

Meanwhile there has been a steady increase in operating and administrative expense due to repeated advances in labor cost; to the increased cost of material, such as rails, timber, cement and machinery; to the passage of laws in behalf of the workers such as the safety measures and the Workmen's Compensation Act in Illinois, and to the increased cost of making sales, arising from unrestricted competition.

THE COST OF PRODUCTION

According to the figures compiled by the Bureau of the Census, the amount paid in wages was, in 1909, above 80 per cent. of the total selling value of coal at the mine

as 1913 an actual profit return was impossible. As existing facts show, the industry sustained a substantial deficit in these two states.

A considerable addition to the cost of production is caused by the idle time of the mines, during which all overhead and some labor costs must be paid. The average number of productive days worked per annum in these two states is only about 175 out of a possible 300 or more. This idle time of the miners is not confined to one season or period during which they can find employment elsewhere. The men are always subject to call, for which reason they urge a greater daily wage so that their annual income may be sufficient for their needs. This causes these operators to grant abnormal wage advances, which are directly reflected in coal cost.

A MINING YEAR HAS ONLY 1400 HOURS

Many industrial plants which produce standard or basic commodities find it possible to operate 24 hr. per day by using different shifts of men. They work also for 310 or more days a year, or a total of 7440 hr. per annum. Still other industries, on two 8- or 10-hr. shifts per 24 hr. work 300 to 310 days per year, thus operating 5000 to 6000 hr. every 12 months.

DISTRIBUTED COST AND SELLING PRICE OF COAL WITH OTHER DETAILS, UNITED STATES CENSUS OF ILLINOIS AND INDIANA 1909

State	Number of Operators	Gross Capital and Capital per Ton of Product	Expenses						Number of Wage Earners	Coal Produced, Including Coal Coked at Mines Value Including Minor Products	Tons (2,000 lb.)
			Total	Salaries	Wages	Supplies	Royalties	Miscellaneous Expenses			
Illinois.....	470	\$75,257,667	\$51,697,504	\$2,083,668	\$41,991,246	\$4,944,371	\$744,860	\$1,933,359	74,445	\$53,030,545	50,570,503
		per ton	\$1.024	\$0.041	\$0.832	\$0.0977	\$0.014	\$0.038		\$1.05	
Indiana.....	223	35,937,961	14,906,831	604,111	12,273,544	1,198,974	240,494	589,708	22,357	15,018,123	14,723,231
		per ton	\$1.012	\$0.041	\$0.834	\$0.0815	\$0.0163	\$0.040		\$1.02	

COMPARATIVE DISTRIBUTED COST AND SELLING PRICE OF COAL IN 1889 AND 1909 IN ILLINOIS AND INDIANA

State	Census	Gross Capital and Capital per Ton of Product	Expenses			Contract Work	Value at Mines	Tons (2,000 lb.)	Wage Ratio to Value
			Total	Wages	Supplies				
Illinois.....	1909	\$75,257,667	\$51,697,504	\$41,991,246	\$4,944,371	\$51,480	\$52,999,918	50,570,503	79%
		per ton	\$1.488	\$1.024	\$0.832	\$0.0001	\$1.048		
	1889	17,630,351	10,366,069	8,111,253	960,927	26,662	11,755,203	12,104,272	69%
		per ton	\$1.457	\$0.856	\$0.673	\$0.002	\$0.097		
Indiana.....	1909	35,937,961	14,906,831	12,273,544	1,198,974	10,674	14,984,616	14,723,231	81%
		pe. ton	\$2.441	\$1.012	\$0.834	\$0.0007	\$1.018		
	1889	3,435,703	2,581,669	2,045,641	241,094	5,807	2,887,852	2,845,057	70%
		per ton	\$1.207	\$0.906	\$0.718	\$0.0047	\$1.615		

mouth. Since 1909 there have been granted two wage increases—one in 1910 of 5.55 per cent. and another in 1912 of 5.26 per cent. These increases have brought the wage cost per ton of coal produced to 92.44c. in 1913.

In 1913 the average selling price of coal at the mines in Illinois was \$1.14 and in Indiana \$1.11 per ton. This leaves a margin of only 21.6c. in Illinois and 18.6c. in Indiana. Out of this must be paid the cost of material used at the mines; the cost of making sales; all officers' salaries; general expenses; insurance (liability, fire, storm, etc.); taxes (including tax on plant and mineral rights); interest on the investment; depreciation of plant; royalties or charges for the exhaustion of coal.

THREE CENTS OR LESS FOR INTEREST AND AMORTIZATION

The last report of the Bureau of the Census (1909) showed that, without allowing for any interest charge on the investment or for amortization of property, the so called net returns in Illinois and Indiana were only 3c. per ton in Illinois and less than 1c. per ton in Indiana.

The average royalty paid, however, in these two states on coal recovered under lease is 5c. per ton, and the average present valuation of coal land is such as to require a minimum amortization charge of 3c. per ton to recover such land value within the period of the mine's life. It will therefore be seen that in even so good a year

Even one 8-hr. shift in each 24-hr. period with 310 days per year gives 2480 working hours in every 12 months. Because of the unrestricted competition the mine operators of Illinois and Indiana have built more plants than are needed and can only operate for 8 hr. out of every 24, and for 175 days per year, or 1400 hours.

It will be seen, therefore, that as against 100-per cent. plant utilization (24 hr. for 310 days or 7440 hr. per annum) possible in some industries, and as against an average by all industries of 33 per cent. to 45 per cent. (one 8- or 10-hr. shift per 24-hr. period for 310 days), a coal plant is in actual productive use only about 18 per cent. of the time. This makes plant, interest and depreciation charges six times as heavy as for some other industries.

MINERS LOSE \$371 PER YEAR

In addition to ruining the operators, this distresses the miners. For example, the 97,000 miners of Illinois and Indiana who are prevented from working 125 days per year might at the present wage have earned an additional \$36,400,000, or \$371 per man per year, had their employers been able to give them work or had their efforts been expended in other directions.

The present markets for Illinois and Indiana coal can be supplied by 60 per cent. of the mines now being oper-

ated. The interest on the surplus capital invested in these unnecessary mines adds to the cost of production in each.

That labor concurs in this point of view is shown by testimony given by Duncan McDonald, secretary-treasurer of the United Mine Workers of America, in Illinois at a hearing held in Chicago in the latter part of July, 1914, before the U. S. Commission on Industrial Relations.

THE CONSEQUENCES OF THIS WASTE

Having shown the cost of mining coal and having compared it with the revenue from its sale, it remains to measure the consequences of the present low prices.

In Bulletin 47 of the United States Bureau of Mines, Dr. J. A. Holmes, Director of the Bureau, states:

During the past year (1911) in producing 500,000,000 tons of coal we wasted or left underground in such a condition that it will probably not be recovered in the future 250,000,000 tons of coal. In a higher way, our mineral resources should be regarded as property to be held in trust with regard to both the present and future needs of the country. Neither human labor nor human agency has contributed to their intrinsic value and whatever rights the individual may possess have been derived from the general government. The government does not surrender its right, and should not neglect its duty to safeguard the welfare of its future citizens by preventing the waste of these resources.

It is customary to say that the mining of coal is an extractive industry. The phraseology is too weak; it must be considered as a destructive industry. That is to say, each ton of coal removed destroys by just that much the value of the plant engaged in producing it. Also, it destroys by that much the country's coal reserve. Coal once mined or lost can never be replaced. With the life of several of the large coal deposits well defined and with the end not extremely remote, the deliberate waste of coal by the mining methods now in use constitutes an immediate menace. When these operators have under the best market conditions no margin above cost they can work only the choicest areas, and the removal of thinner or inferior parts which must be effected at a much higher cost per ton is out of question. This will be explained briefly.

WHY COAL IS LOST

The major portion of the thick-seam coal in Illinois and Indiana is recovered by the so called room-and-pillar method, the work advancing toward the boundaries of the controlled area from the shaft bottom. By such method pillars of coal of sufficient size to sustain the overlying weight are left standing 25 to 40 ft. apart. Also all coal above certain well-defined lines of parting in the seam is left up to protect the roof until the boundaries of the acreage have been reached.

These pillars and the so called top coal are supposed to be recovered as the work is carried back to the bottom of the shaft. In actual practice, however, this is seldom or never done. Thus the actual coal recovery from any given acreage seldom exceeds 50 per cent. of the total amount in the seam out of a possible 90 to 95 per cent. available by proper mining practice, and for this reason: As the distance from the shaft increases, the expense of haulage and road maintenance becomes also greater. Also the hazard from gas and the loss from mine falls increase. Likewise, in working backward to the shaft the quality of the coal secured is impaired by reason of its becoming mixed with the accumulated refuse of earlier work. Therefore, all these valuable areas are simply abandoned, because the operator cannot afford to pay the extra cost of reclaiming this coal.

It also occurs at various places that substantial bodies of coal lie between the boundary lines of two approximately adjoining mines. The extra haulage cost to either shaft, for the removal of this intermediate coal (although only a few cents), cannot be borne without operating loss. Such areas are therefore entirely neglected and cannot later be recovered because the amount of coal available would not justify the development of a new mine to reach them.

TAXATION AS ANOTHER CAUSE OF LOSS

Although not strictly germane to the subject in hand, mineral-land taxation is an indirect cause of waste. Many operating companies hesitate to secure as large areas as might be economically available to their shafts because they wish to avoid unwarranted tax payments through a long period of years. They prefer to let title to such additional acreage rest with the farmer or other owner who uses only the surface and who, while so using it, does not pay any tax on the underlying coal. Later, it frequently occurs that such an original owner, with an unreasonable notion of the value of his coal rights, makes purchase impossible through his demands for an excessive price. This coal also is abandoned along with the adjoining worked-out area.

This waste of coal should concern the Eastern and Central States sufficiently to cause some relief to be extended to these operators. It is to the country's interest to see that they get enough money to make recovery reasonably complete.

SOCIAL CONSEQUENCES OF LOSS

Aside from the economic waste mentioned herein, the loss of revenue has serious social consequences. The continuous and prolonged lack of any profit in the coal industry makes it impossible for these operators to furnish, in all instances, the necessary safeguards to make mining even a relatively safe occupation.

It has also occasioned the rejection by many of the provisions of the Illinois Workmen's Compensation Act. That is to say, coal companies without current net earnings or any sort of reserve resources are not willing to assume such additional definite obligations as the law proposes, to make provision for the injured workman and his family or even to obligate themselves to make incidental payments of any kind.

Necessity compels them to rest their hope on the throw of chance in a judicial hearing. They rely on a court's decree to leave them something of their capital, whereas if they worked under this law they might as well have no capital for all the return they can hope to get upon it.

For this reason, the anticipated value and beneficent purpose of such legislation are clearly nullified. And until, by common consent, the conditions detailed in this statement of fact have been ameliorated, further effort taking the form of additional legislation, however worthy, rational or desirable, will prove similarly abortive and futile.

COAL AND REGULATION OF BUSINESS

For a part of the present disastrous condition of their industry the coal operators are, perhaps, themselves responsible. They have not organized their business as many other industries have done. However, with the stringent anti-trust laws of the states and the Sherman Act confronting them, much uncertainty has existed and still exists as to what the various laws permit. Because

of this doubt no concerted action has been taken. During the period of waiting for some new light on the laws, many operators have hoped that some solution would come and that they might survive until the dawn, while competitors would fail.

They have been discouraged by the severity of judicial rebuke which has, throughout the last several years, followed many community efforts in other industries. These operators have, therefore, done nothing, but are now prepared to defend their claim to just consideration and a fair return. They do this not alone for selfish reasons but because they want to make appropriate provisions for conserving natural resources and to grant their workers physical and social comforts beyond those now possible.

The recent passage of certain acts, which may with propriety be called enabling laws, encourages these operators to believe that public sentiment has so changed that a possible opportunity to secure relief presents itself. They therefore submit this statement.

HOPE IN THE TRADES COMMISSION

Their hope is that the Trades Commission may be the governmental means through which the nation will ultimately be thoroughly enlightened regarding the absolute equities of their industry. They further believe that, on account of its extent and importance, they are warranted in urging as a first consideration that one of the members of this Trades Commission shall be a capable, experienced man, who is familiar with mining conditions and requirements, is acceptable to the coal industry and who can bring to the commission sound judgment on all matters affecting these interests.

They also hope that through this commission, or upon the sanctioned initiative of the operators themselves, the remedy for present conditions which is evidently necessary may be immediately applied. The propriety of such a remedial plan should be determined later by an appropriate agency of the Federal Government.

TWO KINDS OF COLLECTIVE BARGAINING

There is no desire now or hereafter to establish a coal monopoly. Much less is there a desire among these operators to extort unreasonable profits. But they consider it vitally essential to stabilize the industry for the benefit alike of the workmen, the consumers and investors. It is, they believe, reasonable to assume that as long as the Government sustains and encourages the principle of collective action—as evidenced by the exemption of labor unions from anti-trust measures—it would also sanction a plan enabling coal operators to coöperate in a similarly legitimate way. Particularly do they hope this might be permitted if appropriate and definite governmental control were included to the extent, at least, of permitting all such activities to be known to the public and provided that sufficient and ample penalties be imposed for the violation of all such rules, agreements or laws as may be devised to regulate such collective actions.

Coal operators would not object to, but on the contrary would invite, such publicity and supervision.

THE PURCHASERS COMBINE AND THE SELLERS MUST

This suggestion is particularly pertinent for this reason. On every hand these coal operators are confronted by combined purchasing agencies to which they sell their coal and by unionized workmen from whom they buy

their labor. Thus situated, these operators are obviously at a disadvantage, for while they are disorganized as herein stated, both their buying and their selling are done with collective or coöperating units.

Other industries enjoy a degree of encouragement and protection by the Government which is denied the coal-mining industry. In volume of business, mining is approximately one-half that of agriculture; these major industries are alike in that both work the land in recovering vital necessities for the public use. Yet, regardless of the fact that the exhaustion of the mineral deposits is irremediable, while the loss of soil fertility and productiveness can be overcome, the United States spends only one twenty-fourth as much to promote the mining industry as to help agriculture. Intimately affecting, as it does, the lives and welfare of all our citizens, the coal industry deserves and should receive at the hands of our lawmakers attention proportionate to its importance.

FARMERS ARE AIDED AND COAL MEN RESTRAINED

The publications of the United States Geological Survey and the Bureau of Mines, while helpful in the physical operation of properties, do not contain statistics such as are furnished by the Agricultural Department dealing with costs, values and distribution. The appropriations are entirely too small.

When the Southern cotton growers suddenly found their market demoralized by the European war, prompt investigations were made and assistance rendered. Whatever the major sentiment or opinion may be with reference to the propriety and warrant of such help so extended, the fact remains that, however bad and unfortunate this situation may be, it is still not so serious, except perhaps as to the number of persons immediately involved, as the present coal-producing situation. Nor is it as threatening to the general welfare. For even though all the present cotton crop be lost and return no value whatever, the land remains and later crops are possible. With coal removal or waste, the land is exhausted of such value permanently, and the serviceability and use of a coal-mining plant is not, as with the land, perennial.

Coöperation would not only greatly benefit the workmen and investors in the coal business, but would encourage the establishment of other industries now sorely needed in this country.

WITHOUT CAPITAL INDUSTRY CANNOT PROGRESS

For example, the necessity for the establishment of by-product and coking plants is evident. The utilization of sulphate of ammonia for fertilizer, creosote oil for timber treatment and the products of coal tar for industrial and pharmaceutical purposes is too well known to require further reference. Over \$12,000,000 was paid last year for coal-tar products imported from abroad. Of the 95,000,000 gal. of creosote oil consumed in the treatment of ties and timber, 60,000,000 gal. were imported. Of the 44,000,000 tons of coke manufactured in the United States in 1912, 33,000,000 tons were made in beehive ovens and the waste in smoke was over \$50,000,000.

It is only through coöperation that the coal operators can get together the money needed to establish the coking and byproduct industry on a proper basis in this country. That is to say, the coal man is the proper producer of these byproducts, but he cannot make them because he has not the capital and cannot get it because his business is so disorganized that he has no longer any credit.

Combined Pitot Tube and Multiplying Manometer

Much interest has recently attached to the measurement of the velocities and pressures of air currents circulating in airways and conduits; and in this connection the following brief description of a combined Pitot tube of improved pattern and a multiplying manometer having a direct-reading dial will be of interest to both mining and mechanical engineers who have occasion to take such measurements.

The original form of this instrument, which was designed by the engineers of the Davis Instrument Manufacturing Co., Inc., of Baltimore, Md., is shown in Fig. 1, together with the bracket attachment that can be made in any desired form and of any required dimensions and which enables the observer to make any desired adjustment of the tube in the airway, conduit or draft pipe. The dial shown in Fig. 1, requiring the gage reading to be multiplied a specified number of times, according to

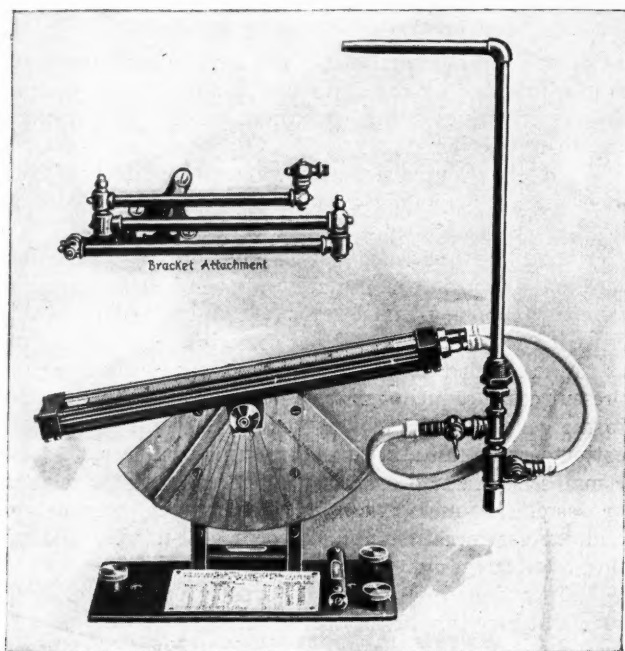


FIG. 1. THE DAVIS COMBINED PITOT TUBE AND MULTIPLYING MANOMETER

the inclination of the gage, will soon be replaced by a direct-reading dial, the design of J. T. Beard, Jr., a mechanical engineer.

After a careful study of the different forms of the well known Pitot tube, the manufacturers of this instrument selected that form of tube which yielded, by experiment, the most uniform and reliable results in the measurement of both pressure and velocity of circulating air currents. Neither time nor money has been spared in the endeavor to produce an instrument that would give accurate and reliable readings and preserve the most serviceable and compact form of the instrument. For this purpose, the form of gage adopted was that known as the multiplying draft gage, in which the reading scale is multiplied any number of times according to the inclination of the gage. By the use of liquids of different densities, also, it is possible to still further increase the accuracy of the gage reading.

To enable the ready calculation of the velocity of the

air current from the observed gage reading, a brass plate, Fig. 2, was especially prepared and attached to each instrument, giving the formulas for the calculation of the weight in pounds per cubic foot, for different barometric pressures, temperatures and degrees of humidity of the air, and the corresponding velocity of the air current for different gage readings and liquids of different densities used in the gage. By the use of these formulas, the calculation of the velocity of the current for varying conditions is made quite simple.

DAVIS INSTRUMENT MFG. CO. Inc. Baltimore, Md. Dec. 17, 1914.

The weight of 1 cu. ft. of Air, at any temperature T , Fahr., and any barometric pressure B , & relative humidity H , is calculated by the formula

$$W = \frac{1.3273 (B - 0.3765 P H)}{460 + T}$$

in which P is the vapor pressure in inches of mercury, for the observed temperature T , as given by Steam Tables.

The velocity V of Air, in feet per minute, due to any gage G in inches is then calculated by the formula

$$V = 1097 \sqrt{\frac{G D}{W}} = 952.5 \sqrt{\frac{(460 + T) G D}{B - 0.3765 P H}}$$

in which D is the density or specific gravity of the liquid used in the Manometer, referred to water as unity.

Example: Find the velocity of an air current when the water gage is 1 inch ($G=1$), the temperature of the Air being 70°F ., the relative humidity 50% and the barometric pressure 30 inches.

Solution: The vapor pressure, as taken from Steam Tables, for a temperature of 70°F ., is 0.739 in. for water gage, $D=1$, which gives

$$V = 952.5 \sqrt{\frac{(460 + 70) 1 \times 1}{30 - 0.3765 \times 0.739 \times 0.50}} = 4013 \text{ ft. per min.}$$

FIG. 2. PLATE ATTACHED TO THE INSTRUMENT FOR CALCULATING THE VELOCITY OF THE CURRENT

The direct-reading dial designed by J. T. Beard, Jr., is shown in Fig. 3, and will need but a brief explanation. Referring to the diagram shown on the left of the figure, the line Aa indicates the position of the vertical gage, which may here be supposed to be calibrated for a length of 10 in. and pivoted at its center, corresponding to O in the diagram. It is evident that if the gage now be inclined to the position indicated by the line Bb , the 10 in. of the inclined-gage scale would correspond to a head of 8 in., indicated by the vertical line Bx . In

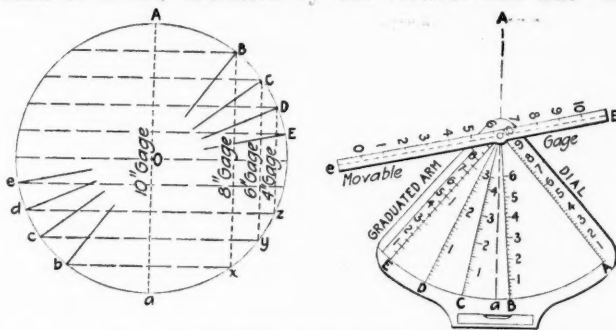


FIG. 3. DIAGRAM EXPLAINING THE DIRECT-READING DIAL

other words, for this inclination, the true gage is 8/10 of the reading on the gage scale.

In like manner, when the gage is inclined to the position indicated by the line Cc , the true gage is 6/10 of the reading of the gage scale; and, for the position indicated by the line Dd , the true gage is 4/10 of the reading of the gage scale. To illustrate, suppose that the gage is inclined to the position indicated by the line Cc , and the reading on the gage scale is 5 in. In this case, the true head or gage is only $0.6 \times 5 = 3$ in.

Now, utilizing this principle, it is possible to construct a dial, as shown on the right in Fig. 3, such that the graduated arm attached to the gage and moving with

it can be read on different scales marked on the dial and graduated to correspond to the different inclinations of the gage. The letters in the right-hand figure correspond to those in the left-hand diagram. It is important to notice, however, that the gage on the right of the figure, which is shown in the position *Ee*, is not necessarily pivoted at its center but can be swung at any convenient point of its length. Also, the length of the graduated arm fixed to the gage and the radial length of the dial can be anything desired, provided the graduations correspond in number to those on the gage scale. While the gage scale is made to read exact inches of gage, it is only necessary that the graduations of the fixed arm and those of the dial should be proportional.

In the figure, the dial is shown as having five graduated scales, *A, B, C, D* and *E*. When the gage is in a vertical position corresponding to the line *Aa*, the graduated arm will correspond to the dial scale *A*, the graduations of which are equal to those on the arm. The graduations of the dial scale *B* are 8/10 in number of those on the arm; those on the scale *C*, 6/10 of those on the arm; those on the scale *D*, 4/10; and those on

the scale *E*, 2/10 in number of the graduations on the arm.

It will be observed from this that an actual gage reading of 5 in. on the gage scale when the gage is in the position *Ee* reads, on the dial scale *E*, simply 1 in., which is therefore the true gage. In like manner, the true gage for any observed gage reading and any inclination of the gage marked on the dial can be read directly from the corresponding dial scale. This makes the most convenient direct-reading, multiplying manometer that has yet been designed.

The instrument must be seen and used to be fully appreciated, as its fine workmanship and delicate adjustments recommend it to the engineer engaged in making accurate fan tests or running boiler tests requiring the careful determination of the velocity of flue gases, and in all determinations of the velocity of air or gas in conduits or airways. The manufacturers are working to produce a dial that will read at once the velocity of the current in feet per second and the pressure in pounds per square foot or ounces per square inch, for all probable atmospheric conditions of temperature, pressure and humidity and for a liquid of any specific gravity.

Effects of the European War on Our Export Trade--II

By J. S. BURROWS*

SYNOPSIS—The second installment of this article makes a critical analysis of conditions in Great Britain as regards production, consumption and exports. As the predominating figure in the world's coal markets, the situation in that country will be a controlling factor in the future trade. The author points out the fact that even should we obtain the entire South American business the tonnage involved is not great enough to influence our markets as a whole.

It is quite generally known that England, the second largest coal producer in the world, is the principal coal-exporting country, about 50 per cent. of the world's export coal coming from her mines. Naturally, therefore, she is the pacemaker in international competition, and to a large extent the export trade of other countries depends upon what England is or is not able to do. Through her virtual control of merchant shipping, ownership of extensive and varied industrial enterprises all over the world, and her dominance of international finance and banking she holds her trade by more than one means.

SOME PROBLEMS OF THE BRITISH COAL INDUSTRY

Those who write or talk on the export question needs must look to English experience and statistics for their data, and the subject of the English export trade has been of late thoroughly covered in the press. Occasionally a writer appears who tells us that the British coal production has reached its maximum and must now decline, giving America the long-looked-for opportunity

to take her rightful place as the dominant coal exporter of the world. Such a view only amuses the Englishman who, with his more intimate knowledge of the subject, sees other sides to the question than the mere matter of output curves. It should be evident that the English coal fields are nearer exhaustion than those of the United States, but to advance this fact as an argument for increased coal exports from this country is to deal in distant futures that do not affect the current situation in any way.

The real problem in British coal mining is the increasing cost of labor, which, after all, is only one of the items that combine to make up the selling price of coal. We have ample evidence at home, as well as elsewhere, that in considering export prices, the burden of an extra expense can be taken off the product and placed elsewhere to gain a needed advantage.

Great Britain's normal coal production is indicated by the following outputs for the four years preceding 1914:

Year	Gross Tons	Year	Gross Tons
1910	264,433,000	1912	260,398,000
1911	271,892,000	1913	287,412,000

In the general table of the world's coal production, her annual output is given as 287 million tons. It is now of interest to estimate to what extent this production is likely to be affected by the war, in which we are fortunate in having some figures already made by Messrs. Davies & Hailey, of Cardiff.

These statisticians estimate that about one million men are engaged in coal mining in the United Kingdom, and that they represent 9 per cent. of all the industrial workers. They further estimate that fully one and one-half million laborers have answered the call to the colors,

*Fuel expert, Castner, Curran & Bullitt, Norfolk, Va.

and that the proportion of these men already taken from the mines, as well as those who will enlist during the year, will result in a reduction of 20 per cent. of the total mine labor. It is estimated that this will decrease the British production about 53 million tons, making the available supply 214 million tons per annum instead of the normal 267 tons.*

BRITISH EXPORTS AND CONSUMPTION

About one-fourth of the total British coal production is shipped to foreign markets; the actual exports for the past two years and for the first six months of 1914 were as follows:

TABLE 7—TOTAL EXPORTS OF COAL FROM GREAT BRITAIN

Year	Gross Tons	Year	Gross Tons
1912	64,445,000	1913*	35,526,000
1913	73,400,000	1914*	34,586,000

*Six months to June 30.

Great Britain, it will be seen, requires normally about 75 per cent. of her total production for home consumption, leaving a surplus for export of 25 per cent. The extent to which this surplus will be affected by her reduced output will, of course, depend on the home demand during the war. To again quote Messrs. Davies & Hailey, they estimate the home requirements and the reduction in the same as follows, in gross tons:

TABLE 8—CONSUMPTION OF COAL IN GREAT BRITAIN

Industry	Normal Consumption	%	Consumption for War Period	Reduction, %
Iron, steel, etc.	55,000,000	29	44,000,000	20
Manufacturing	55,000,000	29	44,000,000	20
Railways	13,000,000	7	11,700,000	10
Gas making	16,000,000	9	16,000,000	nil
Domestic	30,000,000	15	30,000,000	nil
Bunkers	21,000,000	11	17,500,000	16
Total	190,000,000	100	163,200,000	..

According to these figures, the reduction in home needs will be something in the neighborhood of 27 million tons. If we deduct the estimated war consumption from the reduced war production of coal (214 million) we have a surplus of 51 million tons, which is about two-thirds of the normal supply of British export coal. The possible disposition of this surplus will be taken up under heading, "The World Demand for Coal."

Chart No. 2 summarizes graphically the exports of British coal, showing the first months of the war compared with two normal years and 1912, the year of the last British strike.

The chart showing monthly exports of British coal from 1911 to 1914 is constructed on a base line which represents the normal average monthly shipments, allowing for the natural increase in tonnage as indicated during the past five years. The black areas above and below this base line represent the tonnage shipped each month above or below normal. The total shipments for any month may be ascertained by reading up from the bottom of the chart, and the excesses or shortages noted, by reading up or down from the normal base line.

The years 1911 and 1913 represent normal conditions, while 1912 is a wonderful illustration of the recuperation of the industry following the miners' strike in March of that year, which is seen in the excess tonnages handled the last half. The year 1914 started out below normal as will be seen from the black areas below the base line, and was just beginning the corresponding excess area above normal in July when interrupted by the war, the full effect of which may be seen in the large black area from

*After deducting coal used at mines.

August to November, 1914. This shortage represents a falling off in shipments of nearly 50 per cent. and a total of about 11 million tons. We know, however, that the falling off in shipments during the first months of the war was not occasioned by any lack of coal, but was due to an embargo established by the government on certain varieties of coal, which, however, was soon lifted. Later, the shortage is attributable to financial conditions and a decreased demand from all quarters. British exports to various countries are shown herewith in tabular form.

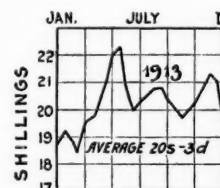
SUMMARY OF CONDITIONS IN GREAT BRITAIN

To summarize the supply for the war period, it would appear that while Great Britain will suffer a curtailment in production of about 20 per cent., due to the enlistment

AVERAGE PRICE
BEST LARGE STEAM
F.O.B. CARDIFF

	s	d
1909	16	0
1910	16	5
1911	17	8
1912	18	1
1913	20	3
1914	19	3

• 1st 6 months



AVERAGE MONTHLY
SHIPMENTS

	Shipments
1909	5,256,000
1910	5,173,000
1911	5,383,000
1912	5,370,000
1913	6,116,000
1914	5,764,000

• For 6 months

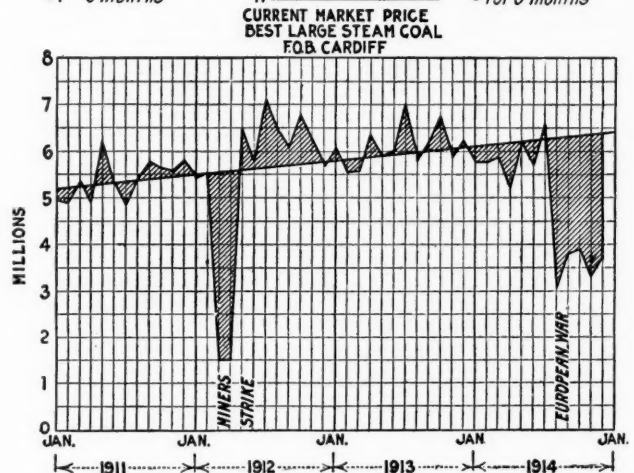


CHART II. BRITISH EXPORTS BY MONTHS AND MARKET PRICE OF BEST LARGE COAL

of the miners, her decreased consumption will leave available for export purposes at least two-thirds of her normal supply, or about 51 million tons. Out of this surplus, however, must be taken the extra coal, above normal requirements, needed by the allies' fleets. Admiralty shipments in the early stages of the war would indicate that about 10 million tons will be required for this purpose, according to Messrs. Davies & Hailey. In this connection it is well to remember that this tonnage affects only certain mines and will probably take out of the market altogether a large amount of the very best grades of Admiralty Welsh coal.

Less naval requirements, the surplus of coal available for export purposes appears to be 41 million tons. Thus, so far as Great Britain is concerned, the problem is one of demand and to what extent she will have to care for her allies before having coal available for shipment to neutral markets.

THE WORLD DEMAND FOR COAL

As before stated, the world's normal coal consumption is about one and one-third billion tons per annum, of

TABLE 9. COAL EXPORT MARKETS OF THE WORLD
(Geographical Groups)

Trade Group	According to Usual British Classification		Foreign Suppliers under Normal Conditions	Source of Supply for War Period
	Normal Demand Foreign Coal Estimated	Loss during War Period		
North Atlantic: Canada, etc., Bermudas, West Indies, Mexico, Central America, Colombia and Venezuela.	20,000,000	20%	{ Naturally the principal export market of the United States, in which foreign competition is rapidly vanishing.	No interruption to normal source of supply.
South Atlantic Coast: South America, Brazil, Uruguay, Argentine.	6,500,000	25%	{ Practically a British market which has been repeatedly assailed by American shippers with some success.	A shortage of British coal and, or, interruptions and war risks to British shipping would turn this market entirely to U. S.
Pacific Coast: South America, Peru, Ecuador, Chile, Bolivia, North America.	1,250,000	25%	{ Australian and British coals compete. Some progress made with American coal.	Australian and American coals will compete.
Mexico, U. S. A., Br. Columbia, Alaska.	1,000,000	20%	{ Australian, British Columbia, Japanese and some English coal compete. A small tonnage of American coal also taken.	No change in source of supply. Probably increase in American shipments due to opening of Panama Canal.
European: Russia, Sweden, Iceland, Whale Fisheries, Norway, Denmark, Germany, Holland, Belgium.	55,000,000	50%	{ British coal competes with German, the latter having lately made great progress against the superior English tonnage at seaboard.	England and Germany will make every effort to supply their allies and neutral countries may have to depend on U. S.
Mediterranean: France, Portugal and Azores, Madeira, Spain and Canaries, Gibraltar, Italy, Switzerland, Malta, Egypt, Austria, Hungary, Greece, Bulgaria, Roumania, Turkey, Tripoli, Tunis, Algeria, Morocco, etc.	42,000,000	50%	{ British coal has virtually held a monopoly on seaboard, although meeting with increasing German competition within recent years. It has been open to American coals at various times and each year sees an increase in shipments from this country.	England and Germany will make every effort to supply their allies and neutral countries on seaboard will have to depend on the U. S.
Africa: West Coast, Ascension and St. Helena.	1,000,000	20%	{ British market opened lately to American coal.	Probable curtailment of British shipments will increase American tonnage.
South Africa: East Coast.	250,000	20%	{ British coal competes under favorable conditions with Natal coal.	Little or no interruption to normal source of supply.
Mauritius, etc., Bourbon, Arabia, Persia, Aden, etc.	250,000	nil	{ So. Africa and Indian coals compete with comparatively small tonnage British coal.	Little or no interruption to normal source of supply.
Indian Continent	250,000	nil	{ Australian and Japanese coals compete with Indian coal.	India and Australia can meet all demands.
Far East: Ceylon, Straits Settlements, Java, etc., Philippines, Siam, Hong Kong, China, Japan, Australasia, Pacific Islands.	6,000,000	20%	{ British, Japanese, Australian, and Indian coals compete.	Japan can amply supply and will probably dominate this market.

which about 140 million, or a little more than 10 per cent., is export coal. We have already reviewed the origin of this export coal and we will now examine the markets to which it is shipped and see how they are affected by the war. To do so intelligently necessitates an investigation

of both normal times and the extraordinary conditions which obtain during the present abnormal situation.

Table 9 has been compiled to show the principal coal-importing markets of the world. Both the normal demand and the estimated reduction in percentages are shown, also the usual source of supply, together with the probable source for the war period. A careful reading of the table will make further comment unnecessary.

Table 10 embraces the detailed and combined shipments of coal from the two leading international traders, Great Britain and Germany. This table is based on the returns for 1913. A careful study of this table will also prove valuable.

Under existing conditions it is reasonable to assume that Great Britain and Germany will first of all look out for the requirements of their respective allies. Whatever the demand may be from these quarters, we may as well eliminate from our calculations the fuel requirements of the belligerents. Their combined needs represent a normal demand for 56 million tons, or more than half of the total export trade of Great Britain and Germany. The neutral countries represent a normal demand for British and German coal of nearly 55 million tons. With the allies' fleet in command of the high seas the possibility of Germany supplying any oversea markets is very remote; furthermore, it is believed, with her neighboring markets, she will have all of the trade that can be cared for. The problem of demand therefore narrows down to determining, as well as possible, the effect of the war on coal consumption in neutral countries and Great Britain's ability to hold her position in these markets.

The slowing down of trade and manufacturing generally throughout the world has resulted in a decreased demand for coal in neutral countries, as well as those at war. Of the total exports of the world (140 million tons) it is said that 46 million tons finds its way to ships' bunkers at foreign coaling stations, Great Britain's shipments

TABLE 10. COMBINED EXPORTS OF GREAT BRITAIN AND GERMANY

To Neutral Countries			
	From Great Britain, Gross Tons	Germany All Fuel, Gross Tons	Total, Tons
Sweden.....	4,563,000	177,000	4,740,000
Norway.....	2,298,000	19,000	2,317,000
Denmark.....	3,034,000	370,000	3,404,000
Netherlands.....	2,018,000	7,650,000	9,668,000
Portugal (Azores, Madeira).....	1,356,000		1,356,000
Spain and Canaries.....	3,648,000	279,000	3,927,000
Italy.....	9,647,000	1,197,000	10,844,000
Greece.....	727,000		727,000
Egypt.....	3,162,000	90,000	3,252,000
Algeria.....	1,281,000		1,281,000
Gibraltar.....	354,000		354,000
Malta.....	700,000		700,000
South Africa.....	65,000		65,000
India.....	179,000		179,000
Straits Settlements.....	31,000		31,000
Ceylon.....	239,000		239,000
Chili.....	588,000		588,000
Brazil.....	1,886,000	46,000	6,936,000
Uruguay.....	723,000		723,000
Argentina.....	3,693,000		3,693,000
Switzerland.....		2,501,000	2,501,000
Other countries.....	2,008,000		2,008,000
	42,219,000	12,632,000	54,851,000
To English Allies			
Russia.....	5,998,000	2,103,000	8,101,000
Japan.....	small		
France.....	12,775,000	3,626,000	16,401,000
Total.....	18,773,000	5,729,000	24,502,000
To German Allies			
Germany.....	8,952,000		8,952,000
Austro-Hungary.....	1,056,000	12,308,000	13,364,000
Turkey.....	369,000		369,000
Belgium (a).....	2,031,000	7,174,000	9,205,000
Total.....	12,408,000	19,482,000	31,890,000
RECAPITULATION			
English Allies.....	18,773,000	5,729,000	24,502,000
German Allies.....	12,408,000	19,482,000	31,890,000
Total Belligerents.....	31,181,000	25,211,000	56,392,000
Total Neutrals.....	42,219,000	12,632,000	54,851,000
Grand total.....	73,400,000	37,843,000	111,243,000
(a) Now German territory.			

to coaling stations for British ships alone amounting to from 35 to 40 million tons annually. Any reduction in the amount of steamship tonnage engaged has a serious effect on the export demand for coal, so that in the present condition of shipping we are able to account for a large part of the decreased demand. Add to this a decrease in manufacturing and its effect on railway transportation in neutral countries, and we may assume a reduction to the extent of at least 20 per cent. for the neutral countries, which figure is borne out by the export movement of coal in the early stages of the war.

THE POSITION OF GREAT BRITAIN

When considering Great Britain's ability to meet the reduced demand for coal in neutral countries, in our review of her probable supplies for the war period, we estimated her surplus over home and naval needs at 41 million tons. Her first duty is to her allies, of which France will need the most coal, both on account of the condition of her mining industry and the loss of German coal. The normal consumption of coal in France is placed at about 61 million tons, of which the greater part is used in the Paris district. Messrs. Hailey & Davies estimate the war consumption of France at 30 million tons, of which her mines will be able to furnish only six million. The remainder for this country's use, including military purposes will therefore have to be shipped by England. This would take 24 million tons of British coal, leaving 17 million tons with which to supply the comparatively small needs (say five million tons) of her other ally, Russia, and the neutral markets of the world.

TABLE 11. PRICES OF BRITISH COAL*

Description of Fuel	Jan. 1, 1914	July 1, 1914	Jan. 1, 1915
Best Northumbrian steam coals f.o.b. Tyne.....	\$3.36@3.48	\$3.24@3.30	\$2.94@3.00
Best Northumbrian steam smalls f.o.b. Tyne.....	1.68@1.80	2.04	1.68@1.74
Best Durham gas coals f.o.b. Tyne.....	3.60	3.12	3.00
Durham coking coals f.o.b. Tyne.....	3.12@3.36	2.88	2.40@2.52
Best Durham blast-furnace coke del. Tees-side.....	4.68	4.68	4.56
Durham bunkers f.o.b. Tyne.....	2.94@3.24	2.73@3.00	2.52@2.76
Foundry coke f.o.b. Tyne.....	5.04@5.52	4.56@5.04	4.56@4.80
Best Lancashire house coals at pit.....	4.14@4.32	4.14@4.32	4.14@4.32
Best Lancashire slacks at pit.....	2.40@2.52	2.28@2.40	2.28@2.40
Best Yorkshire silkstone at pit.....	3.72@3.84	3.72@3.84	3.72@3.84
Barnsley thick-seam house at pit.....	3.60@3.66	3.60@3.66	3.60
Best Haigh Moor (London) at pit.....	3.48@3.60	3.36	3.60@3.84
Yorkshire steam coals at pit.....	2.94	2.70@2.76	2.76@2.84
Best Derbyshire house coals at pit.....	3.72	3.24	3.24
Large Derbyshire nuts at pit.....	2.76	2.28	2.52
Best Staffordshire house coals.....	4.44	4.20	4.44
Best Welsh steam coals f.o.b. Cardiff.....	4.92@5.04	5.04@5.16	5.04@5.28
Best Welsh small steam coals f.o.b. Cardiff.....	2.64@2.70	2.64	2.88@3.00
Best Semi-bituminous f.o.b. Cardiff.....	4.38	4.08@4.14	4.32
No. 3 Rhondda, large f.o.b. Cardiff.....	4.20@4.32	4.20	4.32
No. 2 Rhondda, large f.o.b. Cardiff.....	3.72@3.78	3.00@3.18	3.60@3.72
Patent fuel f.o.b. Cardiff.....	5.40	5.04	4.32
Best Welsh malting anthracite f.o.b. Swansea.....	5.16@5.76	4.80@5.28	5.40@5.88
Special foundry coke, Cardiff.....	6.72	6.48@6.96	6.72@7.68
Scotch ell coals f.o.b. Glasgow.....	3.30@3.36	2.70@2.76	3.30@3.36
Scotch steam coals f.o.b. Glasgow.....	3.12@3.48	2.52@3.00	2.70@3.18
Scotch splint coals f.o.b. Glasgow.....	3.30@4.08	2.52@3.36	3.18@3.78
Fife steam coals, f.o.b. Methil.....	3.12	3.00@3.12	3.00@3.06
Fife treble nuts, f.o.b. Methil.....	3.12@3.18	2.64@2.76	3.00@3.12
Hetton Wallsend, London.....	5.16	5.16	

Comparing the normal exports of Great Britain with this war period surplus of 17 million tons, it will be seen that there is a very great difference in the figures. The Hailey & Davies estimates show an actual shortage of British coal to the extent of 27 million tons, which, as the present conditions are unprecedented, can only be confirmed or disproved by actual experience. Making generous allowances for error in the above estimates, however, there would still seem to be room for either a consider-

able shortage of the British product or extraordinarily high prices, due to a scarcity.

In this connection, Tables 11 and 12 are of interest as showing the prices of British coals and freights to certain selected points as of Jan. 1, 1915, compared with the month before the war and the corresponding time of the previous year. These prices would indicate that there was a strong demand for British coal and that the expected shortage had already set in as might be inferred from what has been said. The answer, however, may be seen in Table 12 giving the freights to various destinations. No one is able to say what the freight market will be, but it is believed that when the South American crops are harvested and the tide of shipping has set in toward Europe, more vessels will be available for return cargoes of British coal, and it is then that the scarcity of the product may become manifest.

TABLE 12—FREIGHTS*

	Jan. 1, 1914	July 1, 1914	Jan. 1, 1915
Tyne to			
Rouen	\$1.02	\$1.08	\$4.08
Marseilles	1.68	1.86	5.04
Genoa	1.71	1.86	5.16
Alexandria	1.80	1.92	5.40
London	0.75@0.78	0.72	2.76
Cardiff to			
Genoa	1.74	1.92	4.24
Bordeaux	1.02	1.26	2.64
Marseilles	1.68	1.80	3.72
Havre	1.02	0.99	2.76
Barcelona	1.92	2.04	3.84
Las Palmas	1.74	1.68	3.12
Alexandria	1.80	1.80	4.68
River Plate	3.12	3.48	3.90

THE PROSPECTS OF AMERICA

It remains for us to examine carefully our own prospects in the present situation and to learn the extent of our own preparedness to meet an extraordinary demand for coal in the foreign markets. We have always shown great interest in the South American and Mediterranean trade. Before the war started we had even made substantial progress in these quarters; for years past we have shipped coal there under favorable conditions, and made additions of new business there as well as in Europe and Africa.

While our exports overseas are hardly to be compared with those of Great Britain and Germany, yet considering our handicap in the lack of shipping and banking facilities, the growth has been very creditable. Certain of our shippers have engaged in this business for twenty years and know the game thoroughly and the limitations imposed by foreign conditions; others are just breaking into the export trade and assume that is an entirely new line of business. The propaganda for increased export business which we started in this country at the beginning of the war has proved a bitter disappointment to many embryo coal exporters. Independent of financial and other business considerations, which at present and for some time previous to the war have been of critical importance in selling anything in South America, the answer lies in the fact that South America is not a large coal consumer, the total imports for the entire continent being normally about seven million tons. It would not be a difficult matter for four or five of the larger companies already engaged in this trade to take care of the entire South American requirements, even should Australia and Great Britain, which have the lead in these markets, be forced to withdraw.

Under the influence of favorable crop reports, conditions will undoubtedly improve and our exports will increase, but even with a shortage of British coal, Aus-

*From the "Colliery Guardian," London, England.

tralia, our strongest competitor on the West Coast, will remain with unimpaired supplies and prices.

Further concerning this export propaganda, the following pertinent editorial from the *Colliery Guardian* of London will be of interest:

Some indication of the extent of the mineral wealth of the United States is given in a bulletin which has just been published by the U. S. Geological Survey. But this bulletin, which is written by George Otis Smith, the Director of the Survey, and possesses the somewhat grandiose title, "Our Mineral Reserves: How to Make America Industrially Independent," does something to explain the comparative failure of the United States up to now to live up to her predictions of commercial conquest. This may have been due to unreadiness, but there is also a suggestion that the government has no thorough grasp of the problems to be assailed. Taking the section on coal, Mr. Smith says:

The exportation of coal to South American countries must be of advantage both in establishing trade relations and in insuring a balance of trade in our favor. Already shipments to European and South American ports have begun.

To us it is incomprehensible that the simple postulate expressed in the first sentence should require a war to enforce it; as to the second, the shipment of American coals both to South America and Europe was started over 15 years ago. The whole passage, therefore, is supererogatory.

Apparently this message is intended for the American producer, for there is a little homily on the groundlessness of any fears that exportation on a considerable scale will be dangerous from the standpoint of the country's resources—which, by the way, seems to show an incapacity to appreciate the commercial attributes of the whole question, which demands more than mere academic discussion. But whether intended for the American coal operator or the potential customer abroad, the bulletin contains some statements that are not well calculated to inspire confidence in either. Thus it is stated "until the present war broke out, Great Britain was the only country that exported coal in considerable quantity"—what of Germany?—"but Great Britain is already beginning to feel the pinch of poverty in her coal supplies, and it is probable that when peace is once more established she will place restrictions upon her exports of coal." This is truly a strange observation, unless the author is looking far into the misty future; there is no indication that we have suffered any such poverty of supplies, and we do not know upon what grounds Otis Smith contemplates a reimposition of the coal tax. There is nothing in the industrial or political situation to warrant such an assumption. * * *

Up to the present very little has come of the attack upon our markets in South America; on the other hand, our own shipments to this quarter are steadily recovering lost ground. We cannot say that we are surprised. The United States has got the coal and the energy, and, as we have always predicted in these columns, the day must arrive when it would recognize the value of these markets; at the barest reckoning the opening of the Panama Canal must make a difference. But Rome was not built in a day, and, on taking stock, it has been discovered that the ships and business organization are lacking, the fiscal system is embarrassing and the British export trade is still a factor to be reckoned with.

As we attempt to look forward, we must conclude that for the present at least our prospects are quite problematical, depending purely and simply on the movement of ships. No one has yet had the temerity to predict what the freight market is going to do, but it must be evident that if there is an actual shortage of coal and the supply of British coal is going to be inadequate, neutral coal-importing countries will have to depend on the United States regardless of the freight market.

Extracts from a Superintendent's Diary

It is considered quite the thing these days to criticize directors of corporations for trying to direct at too great a distance from the base of operations.

If our directors are typical of all directors, then today's experience leads me to believe that such criticism is not well taken, because directors are not competent to form conclusions even after making personal inspections, and if

they did make such inspections they might feel tempted to "butt in" indiscriminately.

For two years now we have been looking forward to a visit from our directors, but only today was the great event consummated.

On several occasions during that two-year period word came down the line that we might expect the inspection party in a few weeks, but always before we completed our house cleaning the rumor would be discredited and our improvised whitewash squad would be dismissed. But about two weeks ago positive instructions were issued from our general manager's office to prepare for today's inspection, and the wording of the order made it clear that this time there would be no change of plans.

As a consequence the past two weeks has been a busy time for the floating gangs. All scrap iron has been gathered up and classified, mud holes in our roadways have been filled in, grease and oil spots on engine-house floors have been sanded and scrubbed, and two crews with whitewash mixtures have transformed trees, fences and out-buildings into veritable snowdrifts.

In the party were six directors, the company's chief engineer and the general manager. They were making the trip in a private car and were accompanied by a chef, a waiter, a porter, choice eatables, etc.

They spent, all told, some three hours with us. Two hours were spent in wandering about the camp and one hour at dinner in their car. They seemed to regret the fact that they could not remain until the men began to come from work, but the train schedule did not permit.

Not one of the directors was familiar with mining, except in a very general way. This was very evident from the questions which they asked and the criticisms that they volunteered.

At each of the points of interest, such as the commissary, the supply house, the timekeeper's office, the blacksmith shop, the carpenter's shop, the powerhouse, the hoisting-engine room and the fanhouse, they felt called upon to ask for information and to relieve themselves of impressions. Each one of them had a different viewpoint, easily accounted for, as each one of them obtained a directorship in the company for a different reason.

In the commissary they were given opportunity to scrutinize at close range a miner's family, as several miners' wives, accompanied by their entire brood, came in to make their daily purchases while the directors were there. Strange to say, all of the comments were concerned with the size of the families and the general appearance of the children; not one took any interest in the articles purchased or the prices paid.

In the office, the emergency cabinet with its helmets and safety lamps entirely overshadowed the payroll files with their valuable testimony on average earnings and idle days.

Often during the day I caught myself wondering as to the kind of working agreement our miners might be able to obtain if the directors should decide to take such matters out of the hands of their managers and decide them as they saw fit. Editorial writers have insisted that such a change is to be desired; I haven't been able to follow their arguments with any degree of conviction.

Don't forget the *SUCCESS* number of *COAL AGE*, April 3. Have you sent in your story? **THIS IS THE LAST CALL.**

Rescue Work at Layland Explosion

BY GEORGE S. RICE*

SYNOPSIS—At the Layland mine, seven men were saved in the preliminary rescue work. Five men walked out after four days' entombment, and then the rescuers succeeded in reaching 42 other men who had barricaded themselves in under the direction of a veteran of 72 years of age.

Great interest has been manifested in the rescue operations, following the explosion of Mar. 2 at the mine of the New River & Pocahontas Coal Co., near Layland, W. Va. Many inquiries have come to the Director of the Bureau of Mines regarding the rescue of 47 entombed men and the following statement has, therefore, been prepared, based on reports submitted by members of the bureau's rescue corps, and from general information obtained during a visit to the mine.

The recovery of the entombed men furnishes a splendid illustration that it is wise for men who have escaped the direct violence of an explosion to brattice themselves in, when the exits are filled with afterdamp. It also shows the importance of their keeping calm and collected under the trying conditions which prevail after an explosion.

The Layland disaster killed or imprisoned over 160 men, and also one man on the outside of the mine. He was killed while passing the main entrance, when the force of the explosion burst out at the mouth of the mine.

SEVEN MEN ARE SAVED

Steps for the recovery of those entombed were at once taken by the local management, H. M. Bertolet, general manager, taking charge after his arrival at Layland. The main exit or haulageway was partly blocked, consequently entrance was made through the air course. The fan doors had been blown away, but in less than half an hour emergency repairs had been made, and the fan was forcing air into the outer part of the mine. Most of the ventilation stoppings had been blown down, and in order to advance, brattices had to be placed in the crosscuts, because, at this time, there was no oxygen rescue apparatus at hand.

After these repairs to the fan, ventilation was restored along the outer part of the main air course, and this made it possible for seven miners, with the assistance of the advance rescue party, to escape from an entry which had not been penetrated by the explosion.

State Inspectors L. B. Holliday and J. I. Absalom were soon upon the scene, followed by Chief Inspector E. A. Henry and Inspectors R. B. Cobb, L. Blenkinsopp, I. Murray and E. C. Lambert. They worked untiringly searching for survivors and bodies. The work of recovery was conducted with the utmost system and care by the state inspectors and mine management, and the latter saw to it that nothing in the way of supplies should be lacking.

THE RESCUE CAR MADE A RECORD TRIP

Thanks to the officials of the Norfolk & Western and the Chesapeake & Ohio Ry., a record-breaking run to

*Chief mining engineer of the United States Bureau of Mines, Pittsburgh, Penn.

the Layland mine was made by Bureau of Mines Car No. 8. When the notice of the explosion was received by the officials in charge the car was on a branch road three miles from Glenalum, W. Va. The officials of the Norfolk & Western Ry. were at once informed of the need for a speedy transfer of the car to Layland. With remarkable promptness, they arranged to dispatch it to Kenova. It left Glenalum at 12:50 p.m. and reached Kenova, 104 miles away, in three hours. This was only accomplished by side-tracking several trains.

At Kenova, the car was turned over to the Chesapeake & Ohio Ry., which had prepared a clear track for it and hitched on what is said to be the second largest passenger engine in the world. The train fairly flew over the sharp turns in the New River Cañon and reached Quinnimont with only one stop at Thurmond for water. The 133 miles were covered in 3 hr. 16 min., which is said to be record time on this mountain road. The car was then pushed up the steep 6-mile grade to Layland, reaching there at 9:37 p.m., after a journey of only about 8¾ hr. from Glenalum.

Rescue apparatus was hastily flung into waiting cars which took the party up the incline and two miles beyond to the mine mouth. At 10:30 p.m. the crew, consisting of D. J. Parker, mining engineer, Dr. W. A. Lynott, surgeon, H. D. Jones, foreman miner, R. H. Seip, first-aid miner, and Edwin Staley, clerk, was placed under the orders of the state inspectors and entered the mine for exploration work.

THE GARY RESCUE CREW

The oxygen-apparatus crew of 11 men of the Gary, W. Va., mines gallantly volunteered their assistance when the disaster was announced by General Manager E. O'Toole. They started about the same time as Car 8, but having to come by regular trains they did not reach the Layland mine until the next afternoon. The Gary crew, which did valiant service, was in charge of the chemist, Vitus Klier, and had the following members: Andy Toshie, John Christian, H. K. Payne, Julius Kovacs, Nick Sharkey, Richard Haynes, Mike Skipiczky, James Thirtle, Louis Toth and H. L. Ross. J. W. Paul, the bureau's chief of rescue operations, with his assistant, H. D. Mason, arrived from the Pittsburgh station on the same train with the Gary crew and W. J. German, foreman miner from Car 6 followed on the next train.

The 11 men from Gary and the nine from the Bureau made up three rescue crews thoroughly trained in the use of oxygen-rescue apparatus. Under the direction of the state inspectors and Mr. Paul and the general direction of Mr. Bertolet, they worked in successive 2- to 6-hr. shifts, exploring in advance of the rescue men who, being without apparatus, were engaged in bratticing and the recovery of the bodies. The advance exploration was to insure that there were no smoldering fires which might start up with restored ventilation and thus cause explosions by the ignition of any firedamp which might have collected. The apparatus work also expedited the rescue of the men and the locating of bodies.

The exploration continued from Tuesday till Friday night, by which time Mines 4 and 5, which were turned

off Mine 3 and not independently connected to the surface, had been thoroughly explored and most of the bodies taken out.

One of the oxygen-apparatus crews then made an exploration in the main haulage entry of No. 3 mine, as far as the 6th left entry. This proved that the main entry had few falls and little wreckage and led Earl Henry, the chief mine inspector of West Virginia, to plan the reversal of the air current. This change in ventilation would permit the use of the haulage road, since meantime the blockage at the mouth of the mine had been largely cleared away. To reverse the fan involved repairs; so that night all the men were withdrawn in order that the fan might be stopped.

On the following Saturday morning, while these repairs were still being made, Mr. Paul, who happened to be in the mouth of the main entry, was astonished to see five men come out of the mine. They stated that they were from the 9th left entry, in which they had bratticed themselves following the explosion. It appeared that the shutting down of the fan the previous night had caused the atmosphere to clear somewhat in the No. 3 haulage road.

The men were in good condition, having had plenty to drink and enough food to sustain them. They had collected twenty buckets of water before they bratticed themselves in. In the brattice they left a small opening, and kept a guard there to watch for the clearing of the air, and finally when this occurred they came out. As it developed later, however, the air was even then not entirely normal in the 9th left.

Naturally the most intense excitement prevailed, and it at once awakened hope that others might be alive in the mine, although these men stated to Mr. Paul that there were no others alive in the 9th left. It was thought, however, that there might be other men in other cross entries; accordingly the oxygen-rescue apparatus men were called, and one of the crews and part of another were told to go to the 10th left, the other rescue-apparatus men being held in reserve at the entrance of the mine. Meantime inspectors and other rescue men hurried in, but decided to search the 9th left first.

RESCUERS FIND A NOTICE ON HAULAGE ROAD

The oxygen-rescue crews from Gary and the Bureau of Mines, on reaching the mouth of the 10th left, found a written notice, "Mar. 4, 42 live men in 10th left." The rescue men pushed on in the direction indicated and found a strongly built gob stopping of rock, coal and fine dirt, which they immediately attacked and broke through. The canary which was being carried showed no ill effects from the atmosphere, and, accordingly, a messenger was sent out to notify Chief Henry and Mr. Paul that there were live men in the 10th left, that the rescue crew had got through a barricade, that the air was all right and that blankets and stretchers should be brought in.

The party then proceeded and found another barricade 200 ft. beyond the first, which they started to break through. Meantime, Mr. Klier, of Gary, the messenger, found Inspector Holliday and four men at the 9th left, and told Mr. Holliday of the message. On arrival at the inner barricade one of the unhelmeted men was sent to the outside to carry a requisition for blankets and stretchers, and the unhelmeted men finished breaking through the stoppings, disclosing the group of entombed miners who had gathered around the inside of the barri-

cade. Mr. Holliday and the rescue men then entered and helped the men one by one through the hole in the stopping. It was found that all the 42 men who had been inclosed were alive, and in fair shape, considering that they had been confined for four days, with only the food from five dinner pails and a very little bad water. They were then lined up along the entry, the rescue men were placed at intervals, and the procession slowly moved outward.

Mr. Bertolet and Chief Henry, who had entered the mine on receiving the message, had sent for blankets and stretchers, which were hurried in. Some of the rescued men were quite weak, and finally two of them had to be carried out on the stretchers. All the men were carefully wrapped up and taken to a detention station so as to insure them proper medical attention.

The experience of the 42 men was strikingly set forth in a newspaper interview with one of them, Thomas Whalen, when he passed through Charleston a few days later. This appeared in the *Charleston Gazette* of Mar. 9, and the substance of it is worthy of repetition, although I cannot vouch for the accuracy of the detail. The bracketed statements of known facts have been inserted to make the meaning clear. The interview is as follows:

Thomas Whalen, the oldest survivor, who, with his son, John, worked in Room 24 of the 9th entry, heard a rumbling sound. They ran down to the main entry, but the heat was so great that it took their breath; they made a hasty retreat in by on the main entry, seeing on their way the dead bodies of four men who had worked on the motor. These bodies were stretched face downward with their hands outstretched at their full length. Whalen states that the one thing he can remember best was the awful feeling that the top of his head was being lifted off, a sensation giving him terrible agony. The son was using a carbide lamp, while that which his father carried was fed with oil. The latter was extinguished by the force of the explosion, but the other remained burning.

The Whalens ran back into No. 10 entry, where they found 40 other miners, mostly foreigners, who were crazed almost beyond control. By persistent begging they were made to go back beyond the trap door and to work building good walls (across the 10th left entry and air course) whereby to barricade themselves against the afterdamp.

Some of the foreigners wanted to smoke cigarettes. This would have endangered all the entombed men, and it was necessary to use force to prevent it. The men in the 10th entry suffered greater hardship than the five in the 9th left as nearly all dinner pails were left in the main entry, and the only water available was polluted. Only once did Whalen moisten his lips. So great was the hunger of the entombed men that they dug into the coal dust to get crumbs and eggshells which had been thrown away at some meal probably several days or weeks before.

While they were expecting the rescue men, for whom every man waited with implicit faith, they would take turns at watching. Many broke down entirely, and but for the leadership of young John Whalen they would, doubtless, have broken down the wall. (On Friday it was decided to try to send out a man and a hole was made through the walls for that purpose. He carried out the written notice of the 42 men being in the 10th entry, and left it at the mouth of the heading where it was found by the rescue crew. On his way back he was overcome by the afterdamp, but two others ran out and dragged him in through the barricades, which were again sealed.) The rescue party was not heard until they were half way through the inner wall, and then young Whalen gave the order to start meeting them, and, according to Dad Whalen's testimony, little time was lost in complying with the order, despite the terribly weakened condition of the men. When asked how he felt when reached by the helmet men, Dad replied: "I can hardly remember anything because I was so weak and nervous and the awful sight of my dead friends on every hand completely took my memory away from everything else in the world." Dad Whalen is 72 years old, hale and healthy, and gave his interviewer to understand that it was owing to his weakened condition and not to old age that he was the last to leave the mine. He further stated that he expects to be digging coal again within two weeks.

Editorials

The Unforeseen in Mining Legislation

It is easy to be inept in language, and even well meaning lawyers and legislators are not exempt from failures to express themselves plainly. When the Pennsylvania Mining Laws were passed, it was purposed to require that safety lamps used by the workmen should be supplied and maintained by the coal companies. The idea was that the miner should not be obliged to buy a lamp, nor should its care be left to his tender mercies. If each miner owned his lamp the inspection of the lighting equipment of a mine would be difficult, and as many men in the mines are not competent workmen the upkeep would be, in many cases, defective.

But the intention was surely not to require the operator to buy his lamps outright when he might just as satisfactorily lease them from a manufacturing company which would know far better how to keep them in repair and proper working order. Inspection surely would not be less easy, nor would the burden to the miner be any greater under such an arrangement. Surely it was only an oversight which inserted this clause into the Pennsylvania Mine Anthracite Law of 1907:

Whenever safety lamps are required in any mine they shall be the property of the owner of said mine. Art. 3, Sec. 15.

And it was probably a similar inadvertance which caused the following unfortunate requirement to slip into the Pennsylvania Bituminous Coal Mine Law:

All safety lamps for examining mines or for working therein shall be the property of the operator. Art. 4, Sec. 5.

The Virginia Law of 1912 is equally unfortunate:

Safety lamps used for examining any mine or which may be used therein shall be furnished by, and be the property of, the owner of the mine. Chapter 178, Sec. 12.

In West Virginia under the code of 1914 the wording of the law is identical. In the Colorado Session Laws of 1913, Sec. 133 reads:

After the first day of October, only electric lamps shall be used in the coal mines, except in cases generating explosive gas or noxious gases, where an approved safety lamp shall be supplied for each working place for distinct purposes; and all lamps shall be the property of the owner.

Ohio, in its general code of 1910, has a better worded provision. It requires:

Safety lamps used for examining coal mines or which are used in a coal mine shall be provided by the owner of the mine and be under the charge of the agent thereof.

Amendments are needed permitting the companies to lease lamps. If thought desirable, the coal companies could be made just as responsible for their condition as if they owned them. As it is, however, the manufacturing company which is ready to enter into a leasing contract is estopped from doing so because the contract to participate in an illegal act is null and void.

Even if the company, confident in the support of a department of mines, were to be willing to contract with

a leasing company, that lamp corporation would have to refuse because the agreement would not be binding.

It has been repeatedly found that manufacturing concerns can and will keep their own supplies in better service than a purchasing corporation. The Galena Signal Oil Co., for instance, often affords better service to the operator when it contracts to keep bearings in condition than when it supplies the oil and lets the operator figure out as best he may how it should be used.

§

The Gas in Anthracite

Because anthracite contains only a small amount of volatile matter, it is always a matter of surprise that, at least in the United States, it gives out abnormal quantities of gas. Not only are the emanations of gas large, but such as is formed is mostly methane and consequently highly inflammable.

Bituminous coals produce, not only methane, but large quantities of water and carbon dioxide. It is anthracite coal which specializes so markedly on methane. But here it should be stated that we believe there is no available knowledge of the relative gas emanation of anthracite and of bituminous coal, because Chamberlain and other investigators, so far as we know, in making their records regarding such emission of gas, excluded water, which may be truly as gaseous an emanation as methane, carbon dioxide or carbon monoxide.

The paraffins emitted in vacuum by Mansfield coal from Carnegie, Penn., formed roughly 80 per cent. of the whole gas content *as measured* by Chamberlain. It must be remembered that he has nothing to say about the water product. If he had considered it, the percentage of paraffins would probably have been considerably reduced. This Mansfield coal is still bituminous; and consequently it may be asked how, in face of Chamberlain's testimony, it is deduced that water and carbon dioxide are so important as products of metamorphosis up to and including the bituminous stage. The argument is simple. If the assumption just made were not true, we would not find any coal in nature, for peat would progressively gain in oxygen percentage by the elimination of the other elements, the carbon and hydrogen would pass off as methane, and the outcome would be mainly an unburnable body of carbon, oxygen and ash. Despite the fact that coal seems to have an avidity for oxygen, nevertheless coal continues to lose that element as it rises in the scale of its metamorphosis, and this disposition to diminish the percentage of oxygen does not show an appreciable slackening till the element is nearly all gone.

The substance of lignite, when the moisture and sulphurless ash are excluded, contains from 4 to 5 per cent. of hydrogen. The fuel loses some of this in the long course of centuries, but it parts with so much more of its oxygen that in the extended series of metamorphoses from lignite to sub-bituminous and bituminous coal the percentage of hydrogen increases rather than diminishes.

Though the sub-bituminous coal usually contains about 5 per cent. of hydrogen, one sample from Hanna, Wyo., had 6.18 per cent. In Ohio the bituminous coal appears invariably to have over 5 and may even have over 6 per cent.

The reason for this increased hydrogen percentage, which makes for the betterment of the fuel even more than the increase in the carbon percentage, is that for every pound of hydrogen lost as water, 8 lb. are lost as oxygen. For every 12 parts by weight of carbon passing away as dioxide, 32 of the oxygen disappear. That element is abducted by both hydrogen and carbon and so suffers greatly in percentage; for not only is it lost in greater quantity than the carbon and hydrogen, but also the combined weight of these elements far outbalances the weight of the oxygen and can therefore better sustain the continued drain.

We have seen, therefore, that the hydrogen, having an ally in carbon in all its attacks on the oxygen supply of the coal and losing only one part by weight for every eight of oxygen it carries away, comes out of the earlier centuries of stress in relative triumph. Would it be amiss to add that like many other allies, having subdued and destroyed the common enemy, these allies—carbon and hydrogen—after some irregular skirmishes proceed to destroy each other?

The semibituminous coal—that of Cambria County, Pennsylvania, for instance—contains, despite its losses, between 4.37 and 5.36 per cent. of hydrogen in the coal matter when freed from moisture and sulphurless ash. The trend is evidently toward a reduction in the amount of hydrogen. The oxygen has dropped to a percentage between 1.72 and 5.50, so that it becomes less possible for the hydrogen or carbon to pass off by self-oxidation.

Perhaps that is the reason why the hydrogen now begins to pass off mostly in combination with carbon, three parts by weight of carbon passing away in the methane for every part by weight of hydrogen. Were the coal to consist of 75 parts by weight of carbon and 25 parts of hydrogen, the loss of methane might go on indefinitely without a change in the percentage composition of the coal, but the carbon is in somewhat larger proportion and the hydrogen is in much less. Still it is really a remarkable change in the weight of the coal which must take place in order that a semibituminous coal like that in Cambria County may be converted into an anthracite such as is mined in the Schuylkill region.

Let us take a coal from Patton, Penn., with carbon 88.12, hydrogen 5.24, oxygen 3.39 and sulphur and nitrogen together 3.25 per cent. We will assume that the hydrogen is reduced to 2 per cent. and the oxygen to 2.2 per cent., which are about the percentages in the Schuylkill anthracite field. Furthermore, we will make the assumption, which may be overbold, that all the oxygen lost passes away as water vapor and all the rest of the hydrogen not thus spirited away is lost as methane. The nitrogen and sulphur are assumed to be unchanged in actual quantity.

An interesting but simple calculation will then show that 100 lb. of the first coal will lose 1.52 lb. of oxygen, 3.54 lb. of hydrogen and no less than 10.05 lb. of carbon, leaving carbon 91.96 per cent., oxygen 2.2, hydrogen 2 and sulphur and nitrogen 3.84 per cent.

So to make the hydrogen lower only 3.24 per cent. and the oxygen 1.19 per cent., 15.11 per cent. of the coal

substance must pass away as gas. This is an important consideration and throws light on the extremely gaseous nature of the deeper mines in the anthracite region.

It is interesting to note that as coal is about 812 times as heavy as methane and as it loses in the instance given 13.4 per cent. to form that gas, the amount of methane evolved will occupy about 109 times as large a volume as the coal from which it is derived. This latter figure is extremely rough, being based on the assumption that the coal substance in question has a specific gravity of 1.19—an assumption which is hard to deny or to prove.

N. H. Darton stated on Jan. 16 of last year at a meeting of the American Institute of Mining Engineers that the Dorrance mine in Wilkes-Barre, Penn., produced 3390 cu.ft. of gas per min. and that in that neighborhood, 1500 cu.ft. of gas was liberated per ton of coal mined. Very roughly, then, we deduce from the latter statement that the measures contain only about 7 per cent. of the methane generated between the metamorphosis of the coal from semibituminous as typified at Patton, Penn., and the anthracite stage as exemplified at Wilkes-Barre, in the same state.

■

The Outlook on Apr. 1 Contracts

EASTERN

In New England the outlook is anything but encouraging. A large share of what season business has already been entered was undertaken early in the year under the pressure of high coastwise freights, most of it, however, in the same channels as in 1913 and 1914. Buyers who have hitherto bought of agencies that rely on what transportation can be had in the open market have been encouraged all along to wait for the market to "settle down," a process that seems to be well on its way at this writing. There is, therefore, quite a volume of business that is yet to be closed and it will require careful handling to avoid a demoralized market, particularly on Pocahontas and New River coals. While the "asking price" is still \$2.85 f.o.b. Hampton Roads everybody knows the spot price is around \$2.70 or less, and buyers are likely to postpone purchases just as long as they possibly can.

The business outlook is not improved over last year. In scattered instances factories and mills are working on better time, but on analysis these are found to be in special lines and not indications of any improvement that is general. There is no inducement, therefore, to bring buyers into the market for future supplies under present conditions.

Most of the contracts already closed were subject to correction in case freight or prices f.o.b. declined, and that is a further reason for the West Virginia operators to refrain from mining coal that must ultimately be sold at a loss. If these interests would show less rivalry for tonnage and more disposition to mine coal with some respect for the market that must absorb it, there would be much less anxiety over prices later. The senseless over-production of recent years with "market cargoes" and "distress coals" at New England points has been the bane of the market and is the reason why each year so many buyers withhold placing contracts until late in the season. A large number have now, for the past few years, made their contracts from July 1 rather than from Apr. 1,

so pronounced has been their experience in this respect. In August, 1914, "distress coal" sold as low as \$3.15 on cars Boston and this for choice grades of Pocahontas and New River.

With such situations in mind, and present tendencies toward weakness in price, it is hard to see how there can be any snap to the spring market. The export trade under present conditions can hardly be better than spasmodic and cannot be relied upon to move coal in any regular volume. The burden, therefore, will fall on the coastwise trade. In that case a better spirit of coöperation is needed among the West Virginia interests before New England buyers can have much faith in the season's outlook. If the example of Georges Creek operators throughout so dull a year as 1914 could be followed in West Virginia in 1915, it is possible the spring of 1916 would show less skepticism on the part of Yankee consumers.

PITTSBURGH DISTRICT

A leading Pittsburgh district coal interest states that since Jan. 1 they have booked more contract tonnage than in the same period a year ago. In this instance, however, they admit that a similar comparison to Apr. 15 will not look at all as favorable for the reason that a year ago they were holding off from contracting because the wage scale was not settled.

Buyers are extremely apathetic in the matter of placing contracts. Much less than half the annual contracting has been done, and it even looks as though a considerable proportion of buyers would not contract at all at this time, presumably depending on the spot market until such a time as it may be desirable to get under cover with contracts. In business closed, the going prices on contracts at all desirable have not been over \$1.10 to \$1.15 (say 15c. under a year ago) on mine-run and 80 to 90c. on slack. Lower prices than 80c. and \$1.10 have been done, though there are no specific instances of these. On mine-run, prompt lots can be picked up at say 10c. a ton less than these figures, and doubtless sometimes at under \$1.

The contracting as a rule is being done on requirement contracts, intended to represent the full requirements the buyer may have during the twelvemonth, with a tonnage stated in the contract as representing the probable requirements. Operators profess confidence that buyers will not try to beat the contracts by purchasing outside prompt lots when they can be had at well under the contract prices, as is the case at present; but as to this, one naturally has his doubts.

There should be an incentive to buyers to contract for the twelvemonth at present low prices on account of both anthracite and bituminous scales expiring Apr. 1, 1916, so that the contracts will run into the period preceding the suspension, when there is always stocking of coal and a relatively high prompt market. There is also the incentive of present prices being low, but the deterrent influence that prompt prices are materially lower than contract prices, say to the extent of 10 or 15c. a ton.

No prices have yet been named to lake shippers, but there is a possibility that the Pittsburgh Coal Co. may undertake to name prices in a week or so. Inasmuch as there has been practically no inquiry for lake coal it is improbable that such prices, if named, would be anything but nominal. Early in the year there was a lone contract closed for a round tonnage of lake coal, said to be at an

unmentionably low price, probably under \$1.15 for $\frac{3}{4}$ -in. Ordinary quotations, like \$1.15 for mine-run, \$1.25 for $\frac{3}{4}$ -in., \$1.35 for $1\frac{1}{4}$ -in. are understood to be to "consumers," with 10c. off to dealers.

The real prices on lake coal will probably not be made for two or three months, perhaps not until July. It is the universal opinion that lake shipments will be very light in the fore part of the season and confined to the shippers who own mines or have long-term arrangements, while late in the season the Northwest may become disposed to stock up on a suspension scare.

MIDDLE WESTERN

The trend in some quarters is to withhold action in the matter of contracts for another season effective Apr. 1, because of the new alignment presaged in the sale of Indiana and Illinois coal, but most of the operators and wholesalers are now submitting bids on railroad, municipal and dealers' needs at the old figures. The major portion of contracts for Indiana and Illinois coals expires on Mar. 31. Some tendency is observable on the part of consumers to ask for concessions from prices prevailing during the last contract year, but on the whole producers and wholesalers evince no disposition to meet this view.

The agreements with the miners covering wages and tonnage rates extend until Apr. 1, 1916, so that no changes of this nature need be considered in figuring contract prices. It is quite apparent that the increased production of eastern Kentucky mines and the activity displayed by their representatives in the Western markets, will necessarily increase competition found by Indiana and Illinois coals, and may have the effect of reducing revenue on some contract business.

The creation of a selling organization to market 80 per cent. of the Indiana production, which is imminent, is causing some of the Indiana operators to await developments. In Illinois the same hesitancy is indicated, and it is reported that the Franklin County operators, who have a coöperative organization, are going to keep their contract quotations on a parity in territory where competition has existed between them in the past; on the other hand, where their coal is competitive with foreign production, it is stated the Franklin County operators will endeavor to meet competition. In other Illinois fields the operators will likely renew their contracts on the present basis.

Business generally has been so dull since the holidays that most of the operators are unwilling to commit themselves to business for a year's time which will not show remunerative returns, and there is a general disposition not to go below the contract figures of the past year. Some shippers do not intend to enter into contract arrangements, feeling from past experience that contracts are nothing more or less than an option on their product, with no corresponding advantage to the seller. If a dealer has a contract for domestic lump at \$1.60 and the market price is lower during the winter season, he is very likely not to take his contract tonnage.

It is very likely that new contracts will eliminate to a large extent the sale of coal on destination weights, which has been one of the unfavorable features of past contracts with large consumers like the public-service corporations. There is also an evident disposition to curtail the sale of coal on a delivered basis and to quote mine prices only.

Discussion By Readers

Recognition of Bravery

Letter No. 4—I want to say that the editor's brief comments appended to Letter No. 2, COAL AGE, Feb. 27, p. 383, expressing the desire of COAL AGE to obtain the full and frank opinion of its readers in respect to what would be the most suitable recognition of acts of bravery performed by mine workers, will be much appreciated by all interested in this worthy question.

I noted, also, the two suggestions made by "Bykem" on the same page—first, in regard to setting a "standard of degrees of courage"; and, second, as to whether the award should be entirely honorary or otherwise. It seems to me that the words in the editor's comments to which I have referred above, namely, "Deeds of heroism are too costly to be purchased," make it clear that to standardize courage and set degrees of merit on such acts is not within the scope of mortal regulation. Such an attempt would show a great diversity of opinion as to what constitutes "degrees of courage," and, as a result, the award would not be satisfactory to all.

Mine Inspector Rose, p. 385, says, "Train and discipline every mine worker to detect dangerous conditions and to know how to avoid or escape them." Following these instructions, it is possible to establish *degrees of efficiency*, but, I think, we cannot establish similar *degrees of courage*. In the words of another, "Courage can sometimes be carried to the extreme, when it develops into foolhardiness, and no good then results."

In reference to the second suggestion, I would say that a life active-membership in the American Mine Safety Association and a gold medal commemorating the event and service performed would be a suitable award. In case the brave would-be rescuer met his death in the attempt, a suitable memorial could be drafted and presented to his family in proper form. I hope much good will be accomplished as a result of this timely suggestion.

I. R. PACKARD.

Bates, Ark.

Letter No. 5—In considering the matter of a suitable award in recognition of the brave and self-sacrificing work of mine rescuers, the first and most important question that presents itself is, as suggested in "Bykem's" Letter No. 1, COAL AGE, Feb. 27, p. 383, Should the award be of a kind that will *compensate* the rescuer for the service he has rendered and, perhaps, help to partially amend for the injury or loss he may have sustained? My answer to this question is, Yes, by all means he should be compensated in proportion to the sacrifice he has made.

The next question that arises is, How or by what means shall a *lasting* award be made? Before answering this question, let us consider for a moment that, usually, the man who makes the sacrifice is one from among the working classes, on whose daily labor depends the support of a family. If this man is injured or incapacitated for further work as the result of his unselfish and self-sacrificing act of rescue, is it too much to expect that his

future support and that of his family should, in some way, be provided for in the award it is proposed to make as a recognition of his deed? I would ask, Of what permanent value will an "honorable mention" or the presentation of a suitably inscribed medal be to such a one in his helpless condition?

Recalling that the nation makes adequate provision for the pensioning of its sons who have been disabled in their country's service, which called for the *killing* of their fellowmen, I would ask, Why is not the self-sacrificing effort for the *rescue* of a fellowman an even more worthy object for such a provision by law? In my opinion, a law should be enacted providing for the compensation or life pension of one injured or the support of the family of one killed in such service given freely for the rescue of a fellow-worker. It may be argued that the surviving dependents, in this case, are no worse off than those who are the victims of other accidents, but the case differs in being a self-sacrificing, heroic deed. The sufferer is not a victim of an accident.

It is evident to all, on reflection, that it must be a question of great concern to the members of mine-rescue corps as to what would become of their families or dependents in case of their own failure to return alive from the seething hole of foul air and poisonous gases into which they enter. These men are, without exception, volunteers in the work for which they train in the hope that they may be able to render efficient service to their fellows in time of danger. Their ambition is to save life—not to win an "iron cross" or other medal.

In considering this problem we must face and answer the question, What provision is to be made for the future support of a disabled rescuer and his dependents? Such things as honorable mention, iron crosses and suitably inscribed medals will not help to support a family deprived of their natural means of sustenance.

GEO. S. STEWART.

Reynoldsville, Penn.

Longwall in the Pittsburgh Seam

Letter No. 3—In reading the interesting letter of G. R. Waddell, favoring the general adoption of the longwall method of mining in the working of the Pittsburgh seam of coal, COAL AGE, Feb. 13, p. 303, I observe that his chief argument in support of his contention was that "the extra expense for the building of packwalls in longwall work is offset by the reduction in other expenses."

The "other expenses" to which Mr. Waddell refers, in respect to room-and-pillar work, as stated in his letter, are: The turning of a large number of rooms, requiring the payment of yardage for driving the narrow room-necks and the crosscuts; the delay and cost of taking the cutting machines from one room to another; the laying of tracks and switches for each room turned off the entry; the increased cost of gathering the coal at the face of the rooms; and the large percentage of coal lost in pillars.

While I am not familiar with the Ohio field, I am well acquainted with the West-Virginia field and have had much experience in the longwall method of mining in England. Judging from this knowledge and experience, I fail to see how it would be profitable to work the Pittsburgh seam by the longwall-advancing system of mining.

Remembering that the thickness of this seam varies from 4 to 9 ft., I would like to ask Mr. Waddell where he proposes to get his rock or dirt with which to build the necessary packwalls that are required for the successful operation of longwall work. Even assuming that he only builds packwalls on one side of his roadways and trusting alone to the post timbers set at the working face for supporting the roof over the miners, he would still lack sufficient material for building purposes in this thickness of seam.

I fully agree with Mr. Waddell that the longwall method of mining is the best plan to adopt wherever the conditions are suitable for its use. This is particularly the case in the working of thin seams where it is necessary to brush the roof over the roadways or to lift bottom on the roads in order to maintain sufficient headroom for the movement of the cars to and from the face. This work, which is necessary in the mining of thin seams of coal, gives sufficient material for the building of the packwalls and gobbing the space between. Also, sufficient building material is often taken from the partings of bone or rock that occur in many seams. All this material that must be disposed of can be used to advantage in the longwall method of mining.

In closing, permit me to say that I am of the opinion that the retreating method of longwall would be more suitable than the advancing method in the working of the Pittsburgh seam, assuming that it were practicable to adopt this method.

Farmington, W. Va.

J. OLDROYD.

Letter No. 4—I have been much interested in the discussion of whether or not the longwall system can be successfully used in working the No. 8 seam, in eastern Ohio or the Panhandle district. Permit me to express my opinion on this subject and to say that the mine of the Labelle Iron Co., of Steubenville, which is working the No. 6 seam of coal, is now being successfully operated on the longwall system. In that mine, they are working a 1600-ft. breast, in the shape of a half-moon.

The operation has been so far very successful, for the reason that the natural conditions in respect to the bottom and top are favorable to longwall work. The bottom underlying the coal is of a hard nature and, so far, has not caused any trouble by heaving in the roadways. The coal is about 3½ ft. thick and the roof overlying the seam is a solid and hard gray stone. Packwalls are built between the roadways, which are 42 ft. apart. The material used for these packwalls is obtained by brushing the roadways to a height of about 6 ft. A longwall machine is used for undercutting the coal, and this requires 4 ft. of clear space along the face of the coal. After the coal is mined out, the roof gradually settles down on the packwalls, leaving a space of only about 15 in. between the roof and the bottom.

While the longwall system of mining has been a success in this seam of coal, however, I do not believe that it could be tried to any advantage in the No. 8 seam of eastern

Ohio. The roof overlying the No. 8 seam consists, first, of a drawslate, which averages from 8 to 10 in. in thickness. Above this is the roof coal, from 2 to 18 in. in thickness, and then comes a gray soapstone from 4 to 6 ft. thick, which is very often of a soft nature and necessitates much timbering whenever a break has extended through the roof coal. Finally, the overlying limestone is very thick and hard to break.

If the No. 8 seam were to be mined on the longwall system the soft strata lying between the coal and limerock would not permit the gradual settlement of this hard stone. Furthermore it would be very expensive and almost impossible to build packwalls for the reason that they must be built to a height of about 6 ft., or the thickness of the coal and drawslate together. Then, what would happen if the heavy limerock should start to squeeze?

All men familiar with a squeeze in this seam of coal will agree with me that if it once started to sag or squeeze it would be impossible to keep sufficient posts at the working face to successfully undercut or load any more coal. It would also be impossible to keep the roadways open, because the squeeze would force the strata between the coal and limerock down on the roadways and it would be impossible to haul any coal. So far as the bottom is concerned I believe that, in a majority of the mines, it would be favorable to the longwall system, as the bottom is of a limestone nature. I have heard miners coming from England say that this seam could be worked on the longwall system, but I would have to see it tried before I could believe it can be done successfully.

W. H. WERKER,
Deputy Mine Inspector.

Rayland, Ohio.

⌘ Mining Laws, Legislation and Mine Regulations

Letter No. 40—I noticed in COAL AGE, Feb. 27, p. 384, Mr. Lantz's criticism of Mr. Weigle's suggestion that mine foremen should be state officials. I am of the opinion that Mr. Weigle is on the right track in attempting to reduce accidents in our mines, and for this reason I will attempt briefly to sustain his contention, which Mr. Lantz regarded with disfavor.

In the State of Pennsylvania, the mine foreman is required by law, in all mines employing 10 or more persons, to look after the safety of the workmen employed therein. He cannot do this successfully when the burden of "coal getting" is placed on his shoulders. He will naturally try to please the coal company first, because he receives his compensation from them and is under a greater obligation to them than to the state or the workmen of whom he has charge. Mr. Weigle is trying, here, to relieve the foreman of his obligation to the company by suggesting that the companies be taxed, so that instead of paying the mine foreman they would pay him indirectly through the state.

In regard to the mine foreman not having anything to say in the operation of the mine, as to laying it out, system employed, etc., will say that the mine foreman is seldom consulted in regard to laying out a mine or the system on which it shall be worked, which questions are left to the mining engineer to decide. Yet the mine foreman is held responsible for the safety of the workmen in the mine, regardless of what system is adopted. It is true

that the state's interest only relates to safety, and if the foreman is held responsible by the state, why should he be burdened with any duty except to look after the safety features and the enforcement of the mine laws?

It appears by recent court decisions that the company is not liable for accidents in the mines when a mine foreman is held responsible by the law of the state, and damage cannot be collected for injury to workmen unless some defect causing the injury had been brought to the superintendent's notice. Then, why should the coal company dictate the policy of the foreman when he is the responsible person and undoubtedly neglects his duty when he devotes a portion of his time to increasing the output of the mine or performs clerical work and numerous other tasks aside from his legal duties?

I believe the state should dictate or control the selection of the mine foreman, assuming that he is to perform these legal duties; but not to interfere with the company's business when that does not encroach upon safety or hamper him in fulfilling his duties as required by law. However, there should be nothing to interfere with the coal company's placing a man in the mine in charge of getting out the coal; but he should be under the mine foreman and work under his orders, so far as safety is concerned. Additional men, who should act as assistants to the mine foreman, could be employed by the coal company

when the state mine foreman is unable to examine all places as required by law; but these assistant mine foremen should be paid by the company.

A schedule of wages could be arranged, according to the class of the mine, gaseous or nongaseous, the extent of the workings and the number of workmen employed. I might say that where the law now requires a certified foreman at all mines employing 10 or more men inside, one state foreman could attend to at least three mines, where the total number of workmen did not exceed, say 50, and the three mines were not too far apart so as to prevent him having plenty of time to legally attend to his duties. I am firmly of the opinion that the difficulties presented by Mr. Lantz could be easily eliminated, should a bill be drawn along these lines and presented to the legislature for action.

I am agreeing with Mr. Weigle because I believe he is working along the right line, as proved by my own experience in the mines during the last 25 years, in which time I have been officially connected with over 350 coal mines. I have observed that the mine foreman devotes entirely too much of his time to the coal companies' interests; and I am convinced that if he were compelled to drop part of his work there would be a great reduction in mine accidents.

MINING ENGINEER.

Somerset County, Penn.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

CARBON MONOXIDE

This gas, formerly known in mining textbooks as "carbonic oxide," or "whitedamp," is the product of the combustion of carbon in a limited supply of pure air. Because the supply of oxygen is limited the combustion of the carbon is incomplete and the **monoxide** is formed instead of the **dioxide**.

Carbon monoxide is a **colorless** gas. It is extremely **poisonous**, owing to its being absorbed very rapidly by the hemoglobin or red coloring matter of the blood, from which it is separated slowly and with difficulty. The effect on the system is therefore **cumulative** when exposed to the smallest percentage of this gas in the atmosphere breathed. The affinity of carbon monoxide for the hemoglobin is from 250 to 400 times as great as that of oxygen, so that the blood corpuscles are quickly rendered inert and **death** is the sure result. The gas is not displaced by the oxygen employed in treatment, but is eliminated slowly by natural processes that take place in the system, unless the latter is too weak or the percentage of the gas absorbed is too great for such result to take place.

The **treatment** for carbon-monoxide poisoning is the enforced inhalation of pure oxygen, by the use of the **pulmotor**. This is a device that consists essentially of a small portable tank containing compressed oxygen, which is pumped into the lungs by a bellows, while another bellows withdraws the same from the lungs after use. The pressure of the gas in the oxygen tank automatically operates the bellows at a rate of 16 strokes per minute as in normal breathing. A face mask completes the equipment. It is important to draw the tongue forward with tongs provided for that purpose, and to close the gullet leading to the stomach, by a gentle pressure of the thumb on the throat, in order to avoid the gas filling the stomach.

The presence of the smallest percentage of carbon monoxide in the atmosphere breathed is **dangerous** to health and life because of its cumulative tendency, its possible toxic effect on the nervous system and the impairment of the vital organs of the body. The **fatal percentage** of this gas cannot be definitely stated because of numerous other factors that together determine a fatal effect. The more important of these are the following: The depletion of the oxygen of the air breathed; the length of the time of exposure to the poisonous atmosphere; the energy expended in physical work in such atmosphere; the state of health and the normal physical condition of the person.

Some persons are more sensitive to gas poisoning than others, owing to a less vigorous constitution, a temporarily weakened condition, a more nervous temperament, or previous exposure to gas poisoning, the baneful effects being hard to eradicate from the system. For these reasons, what would prove a fatal percentage in some instances of less purity of atmosphere, longer exposure, more difficult work, or physical ailment of any nature, would not necessarily produce fatal results under better conditions and more robust health of the individual exposed to the gas.

The Coal Age Pocket Book

Relative Rate of Absorption by Blood—The experiments of Dr. J. S. Haldane and others have shown that 0.02 per cent. of carbon monoxide in otherwise pure air produces about 20 per cent. of saturation in a brief period of time (20 min.). Since pure air contains 20.9 per cent. of oxygen, the ratio of carbon monoxide to oxygen, in the air breathed, is 2:2090, or 1:1045. But the ratio of absorption, carbon monoxide to oxygen, in this case, is 20:80, or 1:4, the blood showing only 20 per cent. carbon monoxide and 80 per cent. oxygen. Hence, the **relative rate of absorption** by the blood, carbon monoxide to oxygen, is about 260:1, since $1045 \div 4 = \text{say } 260$. In other words, the blood in this experiment absorbed carbon monoxide about 260 times as rapidly as it absorbed oxygen, under the same conditions.

Another **experiment** showed 50 per cent. saturation in the blood when the air breathed contained 0.08 per cent. of carbon monoxide. In this case, the ratio of carbon monoxide to oxygen in the air breathed is 8:2090, or 1:260. But the corresponding ratio of absorption is 1:1, the blood showing 50 per cent. of saturation, or equal quantities of these two gases. Hence, in this case also, the **relative rate of absorption** of carbon monoxide and oxygen is the same as before, namely, 260:1.

Another **experiment** showed 50 per cent. saturation in the blood when the air breathed contained 0.05 per cent. of carbon monoxide. Here the ratio of carbon monoxide to oxygen in the air breathed being 5:2090, or 1:418, and the ratio of absorption, as before, 1:1, the **relative rate of absorption** is 418:1, showing that the blood absorbed carbon monoxide, in this case, about 400 times as rapidly as it absorbed oxygen, under like conditions, in the two previous experiments.

The experiments suggest not only the variation in the rapidity of the absorption of carbon monoxide by the blood of different individuals, with varying constitutions and degrees of health; but show clearly the great affinity of the hemoglobin of the blood for carbon monoxide as compared with oxygen. These facts demonstrate forcibly the danger of working in a mine atmosphere containing the smallest possible percentage of this gas even when the worker is in robust health.

Production of Carbon Monoxide in Mines—Carbon monoxide does not occur naturally in mines, but may be and often is produced in dangerous quantities under the practically unavoidable conditions and occurrences incident to coal mining.

This gas is produced in considerable quantities by any combustion, on a large scale, commonly occurring in the limited confines of mine workings. Examples of this are mine fires and explosions of gas or dust. This gas is also produced by the explosion of powder in blasting. It is produced in dangerous quantities by the slow combustion of fine coal and slack thrown in the waste, in poorly ventilated places and abandoned areas void of circulation. Carbon monoxide is the deadly component of afterdamp, which renders the latter so quickly fatal to life, as shown by the fatal results that follow many mine explosions.

Inquiries of General Interest

The Bituminous Mine Law

Will you kindly explain two statements made in the electrical division of the bituminous mine law of Pennsylvania (1911)? These statements both occur in Art. 11, which is entitled "Special Rules for the Installation of Electricity." This article is introduced by the statement, "The following rules shall be observed, as far as is reasonably practicable, in the mines."

The first statement occurs in Sec. 1, Rule 2, and restricts the normal capacity of a transformer to 5 kw. and that of a motor to 15 b.hp. It would be of interest to know the meaning of this provision of the mining law. The rule reads as follows:

For work underground, when supplied with current at a voltage higher than medium voltage, no transformer shall have a normal capacity of less than 5 kw.; nor shall a motor have a normal capacity of less than 15 b.hp.

The second statement occurs in Sec. 7, Rule 83, which provides for the protection by gas-tight fittings of strong glass, for all incandescent lamps used in gaseous portions of a mine, except lamps not exceeding 8 cp. and without tips and requiring a voltage of not less than 220 volts.

I would like to ask, Why is it necessary to protect lamps of less than 220 volts, while it is not necessary to protect them when they are of a higher voltage?

FRED VINTON, Supt.,
Greenwich Coal & Coke Co.

Saxman, Penn.

Inquiry among mining and electrical engineers has failed to reveal any reasonable explanation for the requirements of these rules to which correspondent has well drawn attention. We understand that the entire electrical section of the bituminous mine law was drafted by an experienced electrical engineer thoroughly familiar with mining conditions. It is impossible to state what he may have had in mind when writing these two rules. As a matter of fact, a number of motors are in use in mines in Pennsylvania, having a less capacity than 15 b.hp.

Without knowing the particular phase or conditions that Rule 83 is intended to cover, the reading of the rule as it appears in the bituminous law and as quoted above is seemingly absurd.

We are glad correspondent has drawn attention to these unexplained points and hope that the same will receive the prompt attention of the Department of Mines at Harrisburg; and that an effort will be made to explain the real meaning of these rules or to have them eliminated from the statutes. We hope that other correspondents will draw attention to similar incongruities in the mining laws of their states.

Formula for Weight of Air

Kindly state if the following formula is correct for finding the weight of 1 cu.ft. of air, at any temperature t and barometer B . Some textbooks give the constants 1.3253 and 459.

$$w = \frac{1.3273 \times B}{460 + t}$$

Peoria, Ill.

STUDENT.

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Ash	8.10
Sulphur	0.80
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Moisture	2.47
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Any information you can give or obtain from the readers of COAL AGE, on this subject, will be much appreciated.

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The subject is one of the greatest interest at the present time and is being thoroughly investigated with a view to ascertaining its possibilities. An interesting point to which the article mentioned above draws special attention is the fact that the distillation of the oil from the coal should be conducted at low temperatures, in order to prevent, as far as possible, the production of gas and to increase the yield of oil.

Examination Questions

Miscellaneous Questions

(Answered by Request)

Ques.—In what proportion will gas be expanded, owing to a rise in its temperature from 70 to 95 deg. F.?

Ans.—Assuming a constant pressure, the volume of air or gas varies directly as the absolute temperature, or, in this case, the volume is increased in the ratio $(460 + 70) : (460 + 95)$, or the ratio 530:555. The value of this ratio is 1:1.047; that is to say, the volume of the gas will be increased 1.047 times, owing to this rise of temperature.

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$$L = \frac{4/3 f I}{l d} = \frac{4/3 \times 50,000 \times 312.3}{16 \times 12} = \text{say } 54 \text{ tons}$$

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$$\frac{n}{50} (W_c + 2W) = \frac{8}{50} (2000 + 2 \times 800) = 576 \text{ lb.}$$

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This makes the total friction $576 + 53.4 = 629.4$ lb. There being the same number of cars on each end of the rope, the weight of the cars is balanced. The weight of the coal is partly balanced by the weight of the rope when the load begins to descend the plane. The net weight acting to produce motion down the plane is, therefore, the weight of the coal less that of the rope; or,

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Finally, dividing the total frictional resistance by this net weight acting to produce motion down the plane gives the required tangent of the angle of inclination. Thus,

$$\tan a = \frac{629.4}{14,665} = 0.0429$$

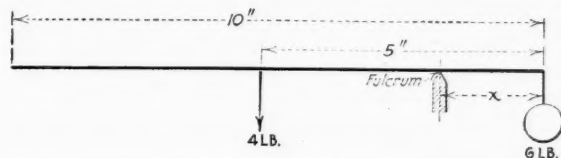
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Therefore, under the assumed conditions, an inclination of $2^\circ 27'$ will be required to produce a self-acting incline, operating eight cars in a trip.

Ques.—An iron bar of uniform section, 10 in. long, weighs 4 lb. If a weight of 6 lb. is suspended from one end, at what point of its length will the weight of the bar balance the weight suspended at the end?

Ans.—Referring to the accompanying figure, the weight of the bar (4 lb.) acts through its center of grav-



ity at the middle of the bar, 5 in. from either end. Let x equal the distance of the fulcrum from the end of the bar where the weight is suspended; then, $5 - x$ is the lever arm of the weight of the bar itself. When the weight of the bar balances the suspended weight, the moments of the two weights referred to the fulcrum as a center will be equal. Therefore,

$$6x = 4(5 - x); \text{ or } 10x = 20$$

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Ques.—What is the reason that firedamp found in wet places in mines is generally more pure and dangerous than that found in dry places?

Ans.—It is very probable that there is less carbon dioxide present in wet places than would naturally be found in the dry workings of the same mine, for the reason that slow combustion producing blackdamp is more liable to be taking place in the dry workings than in wet places. The presence of the blackdamp, as is well known, decreases the explosiveness of firedamp mixtures.

As a matter of fact, however, the conditions cited in the question are not always true, as dry workings are very liable to contain much fine dust suspended in the air, which increases the explosiveness of firedamp mixtures. This is not the case, to the same extent, in wet or damp places in mines.

Inquiries of General Interest

The Bituminous Mine Law

Will you kindly explain two statements made in the electrical division of the bituminous mine law of Pennsylvania (1911)? These statements both occur in Art. 11, which is entitled "Special Rules for the Installation of Electricity." This article is introduced by the statement, "The following rules shall be observed, as far as is reasonably practicable, in the mines."

The first statement occurs in Sec. 1, Rule 2, and restricts the normal capacity of a transformer to 5 kw. and that of a motor to 15 b.hp. It would be of interest to know the meaning of this provision of the mining law. The rule reads as follows:

For work underground, when supplied with current at a voltage higher than medium voltage, no transformer shall have a normal capacity of less than 5 kw.; nor shall a motor have a normal capacity of less than 15 b.hp.

The second statement occurs in Sec. 7, Rule 83, which provides for the protection by gas-tight fittings of strong glass, for all incandescent lamps used in gaseous portions of a mine, except lamps not exceeding 8 cp. and without tips and requiring a voltage of not less than 220 volts.

I would like to ask, Why is it necessary to protect lamps of less than 220 volts, while it is not necessary to protect them when they are of a higher voltage?

FRED VINTON, Supt.,
Greenwich Coal & Coke Co.

Saxman, Penn.

Inquiry among mining and electrical engineers has failed to reveal any reasonable explanation for the requirements of these rules to which correspondent has well drawn attention. We understand that the entire electrical section of the bituminous mine law was drafted by an experienced electrical engineer thoroughly familiar with mining conditions. It is impossible to state what he may have had in mind when writing these two rules. As a matter of fact, a number of motors are in use in mines in Pennsylvania, having a less capacity than 15 b.hp.

Without knowing the particular phase or conditions that Rule 83 is intended to cover, the reading of the rule as it appears in the bituminous law and as quoted above is seemingly absurd.

We are glad correspondent has drawn attention to these unexplained points and hope that the same will receive the prompt attention of the Department of Mines at Harrisburg; and that an effort will be made to explain the real meaning of these rules or to have them eliminated from the statutes. We hope that other correspondents will draw attention to similar incongruities in the mining laws of their states.

Formula for Weight of Air

Kindly state if the following formula is correct for finding the weight of 1 cu.ft. of air, at any temperature t and barometer B . Some textbooks give the constants 1.3253 and 459.

$$w = \frac{1.3273 \times B}{460 + t}$$

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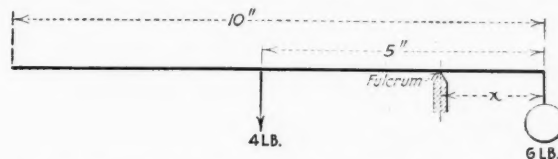
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Coal and Coke News

Washington, D. C.

The Supreme Court of the U. S. has made public the full text of its opinion in the so called North Dakota coal rate cases (Northern Pacific Ry. Co. vs. State of North Dakota, etc.) which involved the constitutionality of the special low rate on coal made by the state commission in intra-state business for the transportation of coal in car-load lots. This rate was made in order to favor the development of the North Dakota coal mining industry.

The opinion of the court is interesting not only from the standpoint of transportation but also from that of the coal business. In a word, the view of the court is that the desire to develop local industries does not warrant public authorities in compelling the carriage of products of those industries at less than cost. The opinion of the court says in summing up the case:

It is presumed—but the presumption is a rebuttable one—that the rates which the state fixes for intrastate traffic are reasonable and just. When the question is as to the profitability of the intrastate business as a whole under a general scheme of rates, the carrier must satisfactorily prove the fair value of the property employed in its intrastate business and show that it has been denied a fair return upon that value. With respect to particular rates, it is recognized that there is a wide field of legislative discretion, permitting variety and classification, and hence the mere details of what appears to be a reasonable scheme of rates, or a tariff or schedule affording substantial compensation, are not subject to judicial review. But this legislative power cannot be regarded as being without limit. The constitutional guaranty protects the carrier from arbitrary action and from the appropriation of its property to public purposes outside the undertaking assumed; and where it is established that a commodity, or a class of traffic, has been segregated and a rate imposed which would compel the carrier to transport it for less than the proper cost of transportation, or virtually at cost, and thus the carrier would be denied a reasonable reward for its service after taking into account the entire traffic to which the rate applies, it must be concluded that the state has exceeded its authority.

With reference to the North Dakota coal situation itself, which gave rise to the question of low rates in the first place, the court takes the view that, however important the industry, the state was not warranted in fixing an unduly low rate.

On this point, the opinion states:

The state insists that the enactment of the statute may be justified as a "declaration of public policy." In substance, the argument is that the rate was imposed to aid in the development of a local industry and thus to confer a benefit upon the people of the state. The importance to the community of its deposits of lignite coal, the infancy of the industry, and the advantages to be gained by increasing the consumption of this coal and making the community less dependent upon fuel supplies imported into the state, are emphasized. But, while local interests serve as a motive for enforcing reasonable rates, it would be a very different matter to say that the state may compel the carrier to maintain a rate upon a particular commodity that is less than reasonable, or—as might equally well be asserted—to carry gratuitously, in order to build up a local enterprise. That would be to go outside the carrier's undertaking, and outside the field of reasonable supervision of the conduct of its business, and would be equivalent to an appropriation of the property to public uses upon terms to which the carrier had in no way agreed. It does not aid the argument to urge that the state may permit the carrier to make good its loss by charges for other transportation. If other rates are exorbitant, they may be reduced. Certainly, it could not be said that the carrier may be required to charge excessive rates to some in order that others might be served at a rate unreasonably low. That would be but arbitrary action. We cannot reach the conclusion that the rate in question is to be supported upon the ground of public policy if, upon the facts found, it should be deemed to be less than reasonable.

One other point likely to be of considerable importance as a precedent in the fixing of coal rates elsewhere is made by the court in affording an analysis of the question what "cost" of transportation really is. The view is taken that such cost includes not only actual expense but also a fair share of general transportation expenses duly apportioned. The opinion says on that point that:

We entertain no doubt that, in determining the cost of the transportation of a particular commodity, all the outlays which pertain to it must be considered. We find no basis for distinguishing in this respect between so called "out-of-pocket costs," or "actual" expenses, and other outlays which are none the less actually made because they are applicable to all traffic, instead of being exclusively incurred in the traffic in question.

Secretary Lane has submitted to the President the report of the Alaskan engineering commission on surveys of various routes for the new government road. The principal question to be determined is whether the line shall run to the east or

to the west of Prince William Sound, and the decision depends largely on which part of the coal fields it will be thought best to develop first, as well as on the relative cost of constructing and maintaining the two routes. Negotiations are also understood to be in progress with the owners of the Copper River & Northwestern, and the Alaskan Northern railroads as to whether one of these lines shall be bought and used as a link in the new route.

HARRISBURG

When the Neville bill relating to the powers and duties of coroners was reached on the third reading calendar in the House, a motion was made to recommit it on the ground that a "snaky" amendment directed against coal miners had been inserted in the measure while it was in committee. This bill gave the coroner added powers in the investigation of deaths and the amendment to which objections were made, read as follows: "Provided also that such death did not occur in or by reason of an accident in any of the anthracite or bituminous mines of this Commonwealth." The amendment will now be dropped from the bill.

Senator Thompson, chairman of the Mines and Mining Committee of the Senate, stated that his committee will report out the Catlin bill (160) sometime during the week of Mar. 15. It will carry two amendments, one favorable to the operators and the other in the interest of the miners. The operators' amendment will reduce the time a man must work as a miner before becoming a foreman from five to two years. This will not be entirely satisfactory to the companies as they wanted no time at all specified.

The miners' amendment brings anthracite workers under the compensation act even more plainly than stated in the bill in its original shape. The modification in the wording is slight, but is thought to be highly important.

Representatives of the miners and operators have been battling for several days with the committee to get action favorable to their respective sides. Chairman Thompson has admitted that he is a nervous wreck, for he has been pushed harder, fought harder and besought harder than all the other senators combined on the Catlin bill.

The governor has suggested that all the revenue derived from the new tax on anthracite coal be turned over to the State Highway Department for road purposes. It will be two years at least until any of the revenue will be released, in case the act is finally declared constitutional, of which there is grave doubt.

The suggestion, however, reveals possibilities that cause anxiety in the anthracite region. The present act apportions a large part of the coal-tax revenue to the counties from which it is derived. The Legislature has the power to rearrange this apportionment and take all of the revenue, or most of it, from these localities, and the increasing demands for state projects might induce the Legislature to commit such an act.

The only excuse for singling out the anthracite coal as a revenue producer was the fact that the deposits are being exhausted and they cannot be replenished—that while the deposits last the producers or consumers should contribute more to the cost of permanent improvements. The argument applies more forcibly to the needs of the localities from which the coal was taken than to those of the state in general. If a special tax on anthracite is justified at all, the greater justification lies in giving the producing localities part, at least, of the revenue to guard against the time when it will vanish altogether.

In order to jeopardize local option, it is thought that orders will be issued to torpedo the governor's workmen's compensation bill and probably to strew a few floating mines in the channel of the governor's child labor bill. These provisions eliminate the common law defense in the workmen's compensation cases incorporated in the administration bill which Senator Crow requested Attorney-General Brown to change but which will stand as outlined when the bill is introduced in the Senate.

The refusal of the governor to free the employer from liability in cases where the accident is caused by the negligence of another employee or when the employee enters the employ of any corporation, knowing that the position in which he serves is dangerous, may mark the first disagreement between some senators on fundamental issues.

The common law defenses, as these provisions now effective are known, would be eliminated by the Governor's bill, and whether or not the employer agrees to abide by the provisions of the bill which are only elective he will be liable for compensation for that kind of accident. In another provision Senator Crow requested that compensation for permanent injury be decreased from 500 to 400 weeks. The governor will likely reduce the maximum payment from \$10 to \$8 a week and from \$5000 to \$4000. It has been found that out of 21,000 cases in one state only seven were totally disability.

Representative McClure introduced a bill in the house, to provide for the health and safety of persons employed in clay, ore and graphite mines and stone, slate, marble and granite quarries and that they shall be operated under the supervision of the State Department of Mines and shall be subject to such rules and methods of operation as may be recommended by the chief of the Department of Mines in accordance with such provisions of the coal-mine laws of the state as may be found applicable to the supervision of above quarries and mines.

The bill provides that inspections of the mines and quarries shall be made by certain district state coal-mine inspectors who shall be designated for the work by the Chief of the Department of Mines.

Representative Horton has introduced a bill in the house to amend section 6, of the Act of 1911 to read as follows: The superintendent shall provide a safety catch or other device to act on the rear end of the rear car of full trips that are being hoisted up slopes, and he shall also provide suitable signals to be placed on the rear end of the rear car of all trips hauled in the mines by locomotives of any kind.

Senator Kline has asked for an appropriation of \$1,275,000 for the trustees of the University of Pittsburgh, \$125,000 of this amount to be used for an addition to the School of Mines, which has been doing good work among the miners in the bituminous region.

PENNSYLVANIA

Anthracite

Nesquehoning—Owing to the decrease in business experienced during the winter, the Nesquehoning colliery, property of the Lehigh Coal & Navigation Co., has suspended operation until further notice.

Scranton—An announcement of General Manager C. E. Toby, of the Delaware, Lackawanna & Western R.R. Coal Department is to the effect that eight collieries of his company will remain idle until Apr. 1. Nearly 10,000 men and boys will be idle. The reason given, for the suspension, is the over-supply of coal and the poor demand, but it is hoped that things will pick up before the three weeks' suspension. The collieries closed are the Loomis, and Avondale in the Kingston district, Cayuga, Brisbin, Continental, Sloan, Dodge and Halstead in the Scranton district. Other collieries of the Lackawanna company are being operated only three days a week and indications are that the operation of these mines will also be further restricted.

Plymouth—Dodson No. 12 colliery, Plymouth Coal Co., is to be abandoned and allowed to flood. A force of men are at work removing pumps, machinery, etc. The Red Ash vein has already been flooded. For a time it was thought that the Kingston Coal Co. might purchase this and the Black Diamond Colliery at Luzerne, but negotiations fell through, the deal was called off and the old colliery, which in its time has sent millions of tons to market, employing about 500 men and boys, is evidently a thing of the past. The injunction secured by this borough against the operator, the late John C. Haddock, for damaging highways put a quietus to its further working as to take out any more coal would, it is alleged, do more and worse damage to the highways of the borough.

Wilkes-Barre—The coroner's inquest into the Oakwood shaft disaster at Prospect colliery of the Lehigh Valley Coal Co., Feb. 17, 1914, in which 13 men met death, resulted in finding the company negligent in permitting the use of naked lights where safety lamps were thought to be imperative. This was brought out by the testimony of mine foremen, explaining that the men would rather work with naked lights, as the roof at this place was 22 ft. high, and with safety lamps the men were unable to detect bad roof. They would sooner take a chance with the gas than with the roof, which was very faulty at this place. The jury recommended that hereafter safety lamps be used, and furthermore recommended the use of the new electric safety lamp recently approved by the Federal Bureau of Mines, for in their opinion men working in a vein 16 to 20 ft. high should have ample light.

Lattimer—Upon entering a smoke filled tunnel in the mine of the Pardee Coal Co. recently, after setting off a charge of dynamite, five men were overcome by the fumes. All were rescued, and all but one resuscitated.

Bituminous

Cecil—T. D. Gladden was awarded a verdict for damages of \$750 against the Pittsburgh Coal Co. The litigation arose out of damage done to crops on his farm and to timber land by noxious gases and fumes that came from a burning gob pile of the defendant company. The pile is on land of the coal company adjoining the Gladden farm. The refuse that makes up the pile comes from the Jumbo mine of the coal company. In 1913 the gob got on fire and burned for many months. The coal company contended they were not responsible for the fire, and could not avoid the noxious gases.

Somerset—Coal operators and fishermen of the state are watching closely the case of the Commonwealth against Archbald Miller of the Loyalhanna Coal Co. Mr. Miller is charged with having turned mine drainage into Shade Creek to such an extent that the stream is no longer fit for fish. It was testified that the mine water had killed all the fish in the stream. The case has an important bearing on the authority of the state to protect streams from pollution when stocked from state hatcheries.

Pittsburgh—The movement of coke throughout the Pittsburgh district is slowly increasing, showing somewhat renewed activities in mills and plants using this fuel. This is regarded as the forerunner of increases in tonnage of other commodities. For the first 11 days of March the coke loading on roads in the Pittsburgh district increased between 6 and 7 per cent. as compared with the similar period the preceding month. A revival in coal traffic is not anticipated until the opening of navigation on the Lakes.

WEST VIRGINIA

Charleston—Suit was recently instituted in the Circuit Court of Raleigh County, by R. L. Milam, to recover from the New River Collieries Co. \$93,000, principal and interest, alleged to be due on a contract between Milam and S. M. Miller, acting as the authorized agent and general manager of the New River Collieries Co. The contract which is said to have been made May 31, 1906, provided that Milam should turn over to the agent of the Collieries Co. options which he held on about 5000 acres of land in Raleigh County, adjoining the first coal operations of the New River Collieries Co. at Eccles.

Tunnelton—The Austen Coal & Coke Co. recently fired a part of its equipment of coke ovens, and it is believed that shortly 100 of them will be burning. This firm is said to have contracts enabling it to work practically its entire force of men, who were thrown out of employment by the destruction of the plant by fire about a year ago. About 300 men will be put to work in a short time, while others will be employed later.

Fairmont—A fire recently occurred in the tippie of the Consolidation Coal Co. at Montana, which for some time threatened to destroy the entire structure. A hose line was quickly gotten into operation, and a bucket brigade formed, and in about an hour the fire was under control. Two tipples occupying the same site as this one have been burned in former years.

Thomas—Hiram Haskell, boss driver at the Thomas No. 25 mine, was recently fined \$50 and costs making \$52.80 in all, after being prosecuted by District Mine Inspector, W. B. Plaster, for running a mine motor loaded with pipe for a pump line past a fire-boss' danger signal. The inspector while presenting the case to the justice remarked that he was glad to get his man while the result of his action would tend to secure the lives of men and not to avenge their loss.

KENTUCKY

Jenkins—The Consolidation Coal Co. in the Jenkins-McRoberts field reports continued improvement in the mining conditions with the announcement also that all the mines will resume full time Apr. 1. A large number of miners idle for several months are to be given work.

Henderson—H. F. Torry, of New York, is making a personal investigation of the Union coal basin, comprising 125,000 acres of coal and mineral rights in Union and Webster counties. Mr. Torry, an expert mining engineer, is said to be representing New York and English capitalists and is reported to be favorably impressed with the field.

Pineville—The spring meeting of the Kentucky State Mining Institute, which has heretofore been held in Lexington, will be held in Pineville this year on May 14 and 15. A statewide first aid contest between teams from various mines is to be a feature of the meeting. This is to be the first meeting of the institute in the mining district and a larger degree of interest is looked for on that account. Miners in the eastern Kentucky field are already preparing to participate.

OHIO

Bridgeport—The Edge Hill Coal Co. and the Blyth Coal Co., of Salt Run, Ohio, have agreed to pay the 47-cent rate demanded by the miners, as a result of which demand the strike has been prolonged. The two companies employ several hundred men, and are preparing to reopen their mines for the immediate resumption of work. The miners are jubilant, declaring that the strike has been won and that other operators will fall in line.

INDIANA

Indianapolis—The bill introduced by Senator J. C. Kolsem, coal operator, Terre Haute, for the codification of the mining laws of Indiana, recently passed both houses of the Indiana legislature and was signed by the Governor.

The United Mine Workers of America will celebrate the 17th anniversary of the establishment of the eight-hour day by observing Apr. 1 as a holiday.

Vincennes—The new Oliphant-Wasson coal mine, near Bruceville, Ind., has begun operations.

ILLINOIS

Mount Vernon—It is stated that A. C. Snively, of Pittsburgh, recently closed a deal with George Thretkeld and W. H. Green, for the purchase of 10,000 acres of Jefferson County coal land.

Princeton—There was recently called in the Circuit Court a case in which the village of Dalzell sued for the condemnation of a piece of property owned by the Spring Valley Coal Co. This property is wanted for use as a street, and the village is pushing the matter of condemnation.

Pana—The Peabody mine broke the record recently when 4800 tons of coal were hoisted in 8 hours. This is an average of 600 tons per hour, or 10 tons per minute.

Freeburg—For the second time within a week, the leasehold of the Missouri & Illinois Coal Co., used in the operation of the St. Clair coal mine at Freeburg, was recently sold at public sale. The first sale was made by the sheriff to satisfy a judgment, and William J. Reichert was the purchaser. The same property was then sold again, a few days later, by the Master in Chancery, under a mechanic's lien held by the Southern Boiler Works, of Belleville, for \$470.50. L. D. Turner was the second purchaser.

Carbondale—The Illinois Central R.R. makes announcement of a new branch line, extending east from Johnston City, Illinois, to Hanaford on the Eldorado Branch. This cuts through virgin coal fields, a large portion of which are owned by the United States Steel Corporation. Several new mines are contemplated in this district in the next year or so.

KANSAS

Ottawa—The coal mines at Ransomville are being dismantled, after having been in operation continuously since 1879. These mines were established by the late Capt. J. H. Ransom. Several years ago they competed with mines in southeastern Kansas. Recently the workings had reached so great a depth that profitable operation was impossible; 14,000 ft. of track will be removed.

ARKANSAS

Fort Smith—Judge Frank A. Youmans, of the United States Court, on Mar. 10, instructed A. S. Dowd, receiver for the Bache-Denman Coal Co., and nine of its subsidiaries, to dispose of the property at his discretion. It was agreed that the leases which the Bache-Denman Co., and others, held on three mines of the Sebastian County Coal & Mining Co. of Philadelphia, would be cancelled in consideration of the Sebastian company cancelling \$20,000 debt against the corporation.

PERSONALS

T. J. Hoffman, who has been the central Ohio representative of the William J. Hamilton Co., has resigned to accept a position with the Elmer Miller Coal Co., of Toledo.

Carlton R. Mabley, for the past five years general manager of the R. I. V. Ball Bearing Co., has joined the selling organization of the S. K. F. Ball Bearing Co.

J. E. Hibbs was recently reelected president of the Strange Creek Coal Co., which operates at Strange Creek, W. Va. F. L. Masten was elected secretary, and F. E. Truesdale, treasurer.

John M. Stauffer was recently elected president of the Stauffer-Quemahoning Coal Co. Walter S. Stauffer was elected vice-president, D. D. Martin, treasurer, and J. S. Braddock, secretary.

Edwin Husband, formerly superintendent of the Wadsworth Red Ash Coal Co., at Birmingham, Ala., has been appointed general superintendent of the National Coal Co.'s mines near Cumberland, Washington.

Stephen H. Green, formerly general manager of the Wadsworth Red Ash Coal Co. at Birmingham, Ala., has recently been elected president and general manager of the National Coal Co., Inc., with head offices at Seattle, Washington.

Thomas Sneddon has severed his connection as general superintendent of the Amalgamated Copper Co.'s coal mines at Diamondville, Wyo. Mr. Sneddon has been in charge of these mines ever since the amalgamated company acquired the property.

The body of William Hale, aged five, and his companion, Albert Tomlinson, aged ten, still living, were found on Mar. 13 in an abandoned mine near Banksville, Penn. The boys had been missing for a week, having wandered into the abandoned mine at play and become lost. The older boy was almost exhausted from exposure and hunger when the searching party arrived.

T. R. Johns, for a number of years general superintendent of the Edensburg Coal Co.'s operations at Colver, Penn., has sent in his resignation to take effect April 1. His successor has not yet been named. Mr. Johns is widely known among coal men of Pennsylvania. The mine at Colver is now producing in excess of 4000 tons daily, and under Mr. Johns' direction this plant has gained wide prominence.

J. H. Carlton, one of the best known mine foremen in the state, was fatally injured Mar. 11 by a fall of rock at the Palos mine of the Republic Iron & Steel Co. Mr. Carlton was about 40 years old and leaves a widow and four children. He was formerly mine foreman for the Tennessee Coal, Iron & R.R. Co. and had held similar positions with the Bessemer Coal, Iron & R.R. Co. at Belle Ellen, and the Sloss-Sheffield Steel & Iron Co. at Flat Top.

A. H. Woodward, vice-president and general manager of the Woodward Iron Co., it is rumored, is to become chairman of the board, and that R. H. Bannister, secretary, will become president, also retaining his duties as secretary. Mr. Woodward has grown up in the iron making business. He is at present head of the operations and has been actively in charge for some time. He is considered one of the best informed iron makers in the district. Mr. Bannister has been associated with the Woodward Iron Co. for a number of years.

OBITUARY

Alexander Hamilton, 72 years old, president of the Gartside Coal Co., of St. Louis, operating mines at Murphysboro, Illinois, also president of the Odd Fellows Building Co., died at his home, 2329 St. Louis Ave. on Mar. 9, after a short illness. Mr. Hamilton was born in Illinois and came to St. Louis at the age of five, and has been a resident of the city ever since. At the age of 15 or 16 years he entered the employ of the Gartside Coal Co., and for a period of over 50 years has been in active service in the coal trade, both operating and retail. Until a few days before his death he was at his office regularly. He is survived by two sons and two daughters.

John S. Atcheson, veteran coal and coke operator, recently died of apoplexy in Pittsburgh. About a year ago, Mr. Atcheson suffered a stroke of paralysis, and at the time of his death had just returned from a trip to the Isle of Pines. Mr. Atcheson was 51 years of age and was born in Allegheny. Since 1880 he had been engaged in the coal and coke business, and in company with J. W. Moore, H. C. Frick, Gilbert Rafferty, and Col. James M. Shoonmaker, he organized the Coal Association in 1884 and became its secretary. He was alone in his room, 614 Curry Building, at the time of his death. His body was discovered by A. M. Blattenberger, a business associate.

CONSTRUCTION NEWS

Harlan, Ky.—The Harlan Gas Coal Co., recently organized, is beginning the initial work on a coal development on the Wasnota & Black Mountain R.R. This will have, it is said, a daily capacity of 1000 tons to begin with.

Jeff, Ky.—It is announced here that the Lexington & Eastern R.R. Co. is making plans for the building of a 20-mile branch railroad line into the Cass' Fork section where an Eastern syndicate has just purchased a large area of coal lands for early development.

Cumberland, Wash.—The National Coal Co. has acquired a 25-year lease on two sections adjoining the present holdings and is opening three new mines and sinking a new slope. In addition it is building a new railroad tippie, bunkers and washery to handle 1000 tons daily.

Della, Va.—The coal operation here, which has been working every day for some time, will be closed down for about 90 days in order to remodel the tippie and lay additional tracks. Enough contracts have already been secured to keep the mine running every day for some time.

Clarksburg, W. Va.—The appearance of a large corps of Baltimore & Ohio R.R. engineers and their survey of a route on the Lowndes Hill and in the Romines Mills section have given rise to the belief that the company is preparing to build a line from Grafton to Weston. Immense coal deposits lie along this route.

Canonsburg, Penn.—Following the recent purchase by H. A. Davis, at Pittsburgh, of 200 acres of coal land, contractors are at work sinking two shafts preparatory to active operations on the property by May 1. The capacity of the new mine will be 800 to 1000 tons per day and about 200 men will be employed. The output of the mine will be used to supply the Standard Tin Plate Co., and the coal will be hauled directly to the Tin Plate company's plant in the mine cars and dumped into bins at the boiler house.

NEW INCORPORATIONS

Springfield, Ill.—The Gilmore & Solomon Coal Mining Co. has increased its capital stock from \$5000 to \$25,000.

Krypton, Ky.—The Krypton Coal Co. has been incorporated with \$1000 capital by Clark Eversole, I. B. Richie and J. A. Collins.

Madisonville, Ky.—The Gordon Mining Company, with a mine in this (Hopkins) county, has filed an amendment to its charter, increasing its authorized capital from \$1000 to \$3000.

Pittsburgh, Penn.—J. Bert Ross, of Buffalo, with several friends, is incorporator of the Fairview Mining Co. of Pittsburgh; capital stock, \$25,000. Mr. Ross was formerly owner of the Glenora mine in the Allegheny Valley.

Cincinnati, Ohio.—The Luhrig Coal Co. has filed amended articles of incorporation reducing its capital stock from \$700,000 to \$52,500. The reduction indicates no change in the company's operations, it is announced, but is made for economical reasons.

INDUSTRIAL NEWS

Buffalo, N. Y.—There are now about 30 coal cargoes in Buffalo harbor, waiting for the opening of navigation. The Delaware, Lackawanna & Western dock, which has loaded most of the cargoes, has suspended operations for the present.

Buffalo, N. Y.—The Delaware, Lackawanna & Western Coal Co. has signed a lease for four offices on the ninth floor of the Prudential Building, Buffalo, and will remove there late in April. For some time the company has been located in the White Building.

Elkins, W. Va.—It is rumored that the Baltimore & Ohio Ry. will buy the Coal & Coke R.R. shortly. The Coal & Coke R.R. now runs into Belington, and should it be purchased, it would give the B. & O. a route from Elkins to Pittsburgh and Wheeling.

Geneva, Switzerland.—It is stated that the largest coal depot upon the Rhine located at Strassburg was recently set on fire by a bomb dropped by a French aviator and is still burning. Four thousand tons of coal have been destroyed and 20,000 more are in danger.

Juneau, Alaska.—The Juneau Land Office has rendered a decision canceling on fraud charges the applications for patents on 41 coal claims in the various coalfields comprising the McKenzie Anthracite Coal Co., the Carbon Mountain

Anthracite Coal Co., and the Alaska Smokeless Anthracite Co. claims.

Washington, D. C.—A charge imposed by the Norfolk & Western and other railroads for dumping coal from piers into boats at Norfolk and Newport News in addition to the regular transportation freight was recently upheld by the Interstate Commerce Commission. Complaint made by the New England Coal & Coke Co. was dismissed.

Whitesburg, Ky.—An Eastern syndicate, composed of New York and Philadelphia capitalists, is said to be represented by a party of prospectors going along Carr's Fork and Troublesome Creek, in Knott County closing deals on a large boundary of timber and coal lands. Knott County has no railroad line but this development would mean a branch extension of the Lexington & Eastern.

Bristol, Tenn.-Va.—The Stonega Coal & Coke Co., one of the largest in the Virginia fields, has contracted for the entire power output of the Electric Transmission Co. of Lee County, with a power house in the Black Mountains. The Electric company's plant has a capacity for 3000 hp. but this will be increased to 12,000 hp., making it one of the largest steam power plants south of the Mason and Dixon line.

Marshfield, Ore.—Fred L. Wilson, a mining engineer and expert of Los Angeles Calif., who has been making an extensive study of coal deposits and possibilities of this section states that his anticipations are far exceeded by the results of the investigation. Coal mining is an industry that has never been extensive here, but Mr. Wilson prophesies that development will bring many eastern factories to this bay.

Seranton, Penn.—Shipments of anthracite during February were 4,275,107 tons as compared with 4,121,451 tons during the corresponding months of 1914, or an increase of 153,656 tons. The Lehigh Valley R.R. led in tonnage for the month with 887,267 tons; the Philadelphia & Reading was second with 692,743 tons, and Delaware, Lackawanna & Western, third, with 630,246 tons.

Philadelphia, Penn.—The proposed increase in freight charges on bituminous coal brought into this city has been forbidden by the Interstate Commerce Commission. The Commission ordered cancellation of increased railroad rates established on bituminous coal from Pennsylvania, Maryland and West Virginia mines to this city and Baltimore for transshipment to points inside the Delaware and Chesapeake Bay capes.

Philadelphia, Penn.—The Federal Grand Jury recently indicted the Pennsylvania R.R. for granting rebates to the Glen White Coal & Lumber Co. on the transportation of bituminous coal and coke from Kittanning Point, Penn., to points in New Jersey and New York. Two bills were returned, the first charging "the granting of concessions with respect to transportation of property in interstate commerce," and the second that the railroad willfully failed to strictly observe tariffs.

Harrisburg, Penn.—There were 600 men and boys killed in the anthracite mines during 1914, being a reduction of 24 as compared with 1913. Four hundred and thirteen men lost their lives in the bituminous regions, being a decrease of 198 as compared with the previous 12 months. The total production of coal was 237,221,835 tons. The anthracite output amounted to 91,367,305 tons, or a decrease of 259,659 tons as compared with 1913. The bituminous production was 145,854,530 tons, or a decrease of 24,081,829 tons as compared with 1913. The number of persons employed in and about the mines was 346,831.

Seattle, Wash.—Andrew Christianson, chief of the field division of the Interior Department for Alaska, whose headquarters were recently transferred from Seattle to Juneau announces regulations from Washington providing for the free use of coal upon public lands in Alaska, thereby permitting cannery, sawmill, and other operators all the coal they need free of charge with which to conduct their business. The new regulation, if taken advantage of, is not only expected to save considerable money for these concerns, but is also expected to provide employment for a number of people who are now in that territory.

Trenton, N. J.—The jury of the United States District Court on Mar. 11 rendered a verdict of guilty against the Central R.R. Co. of New Jersey, on charges of rebating. The indictment against the company charging 185 violations and the jury sustained the indictment. The rebating charge consisted of granting special rates to the Lehigh Coal & Navigation Co. for the shipment of coal from Nesquehoning in the anthracite fields of Pennsylvania to various points in Pennsylvania, New Jersey and New York. The minimum penalty for each count is a fine of \$1000 and a maximum fine of \$20,000. The court deferred sentence.

Coal Trade Reviews

General Review

Full effects of the usual pre-spring dullness are now felt and the hard coalers have made a drastic cut in working schedules. Bituminous consumers feeling out the contract market cautiously and competition keen. Favorable interpretation placed on developments to date. Shortage of steam sizes at interior points.

The large distributing centers are choked with anthracite coal and drastic curtailment policies have been instituted, one of the large hard-coalers having suspended operations at eight of its collieries for a period of three weeks. Although the dullness is perhaps somewhat accentuated, this general slowing down all along the line is characteristic of this period of the year, just preceding the heavy April cut in the circulars down to the summer level. As a result of the light working schedules, the consumption of the steam sizes is outstripping the production; many of the companies have been forced to draw heavily on their storage supplies, which are in some instances now almost depleted.

The bituminous agencies are completely absorbed in negotiations on new contracts. With consumers feeling out the market very carefully for concessions, and extremely cautious about closing, the sellers are generally more anxious than usual, though they express themselves as satisfied with the trend of conditions, considering the general depression in all lines. Operators are fighting aggressively for business, particularly where their old contracts are at issue, and in most instances they are willing to concede moderate reductions on old prices.

The prompt market is fairly well maintained, the producers holding coal more closely at the mines. The weakening in prices is less general than has been the case, and the market seems to be settling down into a situation more nearly on a par with that of a year ago. However, there is still a distinct feeling of depression throughout the trade, and all hopes for a rapid improvement have about disappeared.

The situation in the Pittsburgh district is more discouraging, buyers being firmly in control of prices. Retail buying in Ohio has practically ceased, and the demand is lighter all along the line, with the possible exception of the railroads which are taking a fair tonnage. The curtailed demand for the domestic grades has created a shortage in the steam sizes, which are now moderately active. Production is at the lowest point yet reached, and the outlook in the Lake trade is uncertain and far from satisfactory.

The Southern market is slowing down into one of the worst situations in the history of the trade. There is no activity whatever on domestic grades, a considerable tonnage of which is on demurrage, and mine operations are down to an average of one or two days a week, with a good many mines closed down entirely.

A rather strenuous demand for the steam sizes and a complete lethargy on the domestic grades are the salient characteristics of the Middle Western market. Even offers of April prices for March shipments are failing to stimulate any business, and with the exception of screenings, it is difficult to move coal at any price. This shortage of the steam grades is creating some interest in contracts among buyers. An increased number of mines are closing down which may have a beneficial effect later in the season.

ATLANTIC SEABOARD

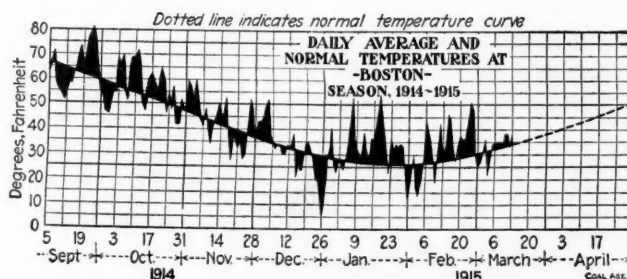
BOSTON

Market conditions ragged. Indications of Pocahontas and New River weakening. Inquiry very light. Georges Creek now competing for season business. Pennsylvania grades practically unchanged. Anthracite beginning to come forward for spring delivery.

Bituminous—Prices on Pocahontas and New River are still uneven, but perhaps less so than last reported. In other words, a weakening in prices, especially delivered prices, is less general than a week ago. The market is "settling down"; season figures have been made within a week that are about on a par with those of a year ago. Any firmness in water

freights has now been discounted in practically all quarters and those shippers who entered contracts early in the season on the strength of "panic freights" will probably have to scale down their prices to something nearer the present level. For those shippers just entering the market the going is rather hard but the fact that transportation people realize that freights are almost certain to recede materially makes it less hard than was feared. If freights go back to 70@75c. the shippers without transportation of their own will not be at such a disadvantage.

The Georges Creek shippers are competing strongly for the contracts now coming into the market. In some cases business has been lost by these interests to those shipping from Hampton Roads but in other cases tonnage has been taken from the latter, so for the time being at least, the Georges Creek shippers are as strong a factor as usual in the New England market.



There are no new developments here in the position of the Pennsylvania grades. The outlook is not so favorable as when water freights were high from Hampton Roads but it is probable the shippers can hold the ground already gained unless there is a serious break in Pocahontas and New River. All-rail prices are fairly firm but the movement is not heavy. Stocks are ample and inquiry light. Anthracite barges are being withdrawn from the bituminous trade coastwise and that has a tendency to diminish receipts at this end.

Water Freights show further signs of weakening. If 75c. has not yet been named on large vessels, Hampton Roads to Boston, for spot leading, the feeling is that it will be very soon. Steamers are now on the way back from European voyages and it is understood that practically all of them will resume their regular runs as coastwise colliers, for the present at least. Less is heard of South American charters, although it may be only a temporary lull. Forty-five cents is once more the rate on barges from New York to Fall River and New Bedford.

Anthracite—Clear weather for some weeks allowed barges to move on schedule and the impending shipments on April prices are likely to be very large. The retailers have been able to get their stocks well worked down. Up the Maine rivers, stocks are very light and now that navigation has opened the dealers there are eager for early shipments. With some of the shippers, individuals in particular, cargoes have already begun to come forward on the reduced spring basis.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	\$0.90@1.40	\$1.15@1.60	\$1.67@1.77	
Philadelphia*	2.15@2.65	2.40@2.85	2.92@3.02	
New York*	2.45@2.95	2.70@3.15	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				\$2.70@2.80
Boston†				3.65@3.90
Providence†				3.55@3.73

* F.O.B.

† On cars.

NEW YORK

Negotiations on new contracts taking definite form. Moderate concessions on old prices the rule but agencies regard the situation as satisfactory. Drastic curtailment in the anthracite production.

Bituminous—Competition of the most aggressive kind still marks the negotiations on new contracts, but conditions are now beginning to assume some definite form, and agencies express themselves as satisfied with the outlook, considering

the prevailing adverse conditions in all lines. Consumers are feeling out the market carefully before closing, and in most cases are insistent upon a moderate concession on old prices; as a rule the seller is willing to meet this demand, in order to close with satisfactory customers. The conservative agencies are devoting little time toward getting any new business; they are fighting aggressively to retain their old business, but, as a rule, they do not show any disposition to create any abnormally competitive situation by trying to land their rivals' tonnage.

In the prompt market the trade is just holding its own. The old optimism as to the future still prevails, even among the most conservative observers, but it still fails to take any tangible form. The producers are reducing shipments by drastic cuts, a notable example being that of the Pittsburgh Coal Co., which is now outputting at the rate of only about 1,000,000 tons per month, as compared with 2,000,000 normally. This is having a decidedly favorable effect at the distributing centers, where consignment coal is being kept so low that some shippers are even moderately embarrassed for sufficient supply at times. The bunker business continues fair, and in fact is running somewhat ahead of normal. Prices continue on the following basis: West Virginia steam, \$2.35@2.55; fair grades, Pennsylvania, \$2.55@2.65; good grades of Pennsylvania, \$2.70@2.80; best Miller Pennsylvania, \$3.10@3.15; Georges Creek, \$3.15@3.25.

Anthracite—Evidence of the extreme apathy in the anthracite trade is seen in the heavily curtailed working schedules which have gone into effect at the anthracite collieries. The storage facilities of the Delaware & Hudson Co. have been so heavily overloaded that eight collieries have been closed down for a period of three weeks. The Lehigh Valley has worked only two days a week during each of the past two weeks. The Reading did somewhat better last week, having operated three days.

A result of these heavy curtailment policies has been to reduce the output of steam sizes to considerably under requirements. Most of the companies have therefore been drawing on their storage supplies heavily, and in many instances these have been practically all picked up. With the possible exception of buckwheat No. 2, and broken coal, there are excessive supplies in every direction.

The market is not notably changed, and we continue it on the same basis as last week as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken.....	\$5.10	\$4.60@5.10	\$5.05	\$4.55@5.05
Egg.....	5.35	4.85@5.35	5.30	4.80@5.30
Stove.....	5.35	4.85@5.35	5.30	4.80@5.30
Chestnut.....	5.60	5.10@5.60	5.55	5.05@5.55
Pca.....	3.55	3.40@3.55	3.50	3.30@3.50
Buckwheat.....	2.80	2.60@2.80	2.50@2.75	2.35@2.75
Rice.....	2.30	2.20@2.30	2.00@2.25	1.90@2.25
Barley.....	1.80	1.70@1.80	1.75	1.30@1.75

BUFFALO

Bituminous improving very slowly. As a rule all contracts are taken at lower figures than last year. No prospect of early improvement. Anthracite season practically closed. Orders for April are light.

Bituminous—Some of the members of the trade report the demand improving moderately, but even they concede that they have, in some instances, been obliged to accept contract prices 5c. or so below last year. It is difficult to see how the mines are going to run on such prices, but it appears that they are preparing to, for no contract would in these days be taken without a mine somewhere to stand behind it. There is a feeling of the utmost depression in the entire trade, except in the case of a few jobbers who are able to proceed on a profit of 5 to 10c. a ton; they are usually situated so that their running expenses can be reduced to very low terms.

A month or two ago there was expectation of a stir in general business at some time not far distant, but that has about disappeared now. But on the other hand there is no money stress and none is looked for; business is merely very dull and quite likely to remain so for some time. The activity expected from the European war has not appeared.

Prices continue at the bottom, \$2.80 for Pittsburgh lump, \$2.70 for three-quarter, \$2.55 for mine-run and \$2.15 for slack, with Allegheny Valley sizes about 25c. lower than Pittsburgh.

Anthracite—The demand is light as is usual during March, but shippers now report that even the April orders are light. As a rule the jobbers have more coal on hand than they reckoned on. The anthracite mines are running only about half time and stocking and loading into Lake vessels have been resorted to rather more than usual to take care of the surplus. If the Western trade should demand an early supply it would be easy to furnish it. The prospect is not encouraging.

PHILADELPHIA

Anthracite continues inactive. Movement at prevailing circular small. Bituminous on about parity with last week, the market indicating little change either in demand or prices.

Anthracite—Shaping conditions for the opening of the new coal year are now absorbing the attention of the anthracite operators. Contrary to expectation, it is not believed that there will be any change in the circular of prices compared with last year. The differential of 25c. per ton at Tidewater and 15c. on the line between stove and chestnut will still obtain. The individuals, of course, if the market warrants it, will exact as much as they can above the so-called circular, and vice versa, will concede enough from their prices to move their output, when necessary; they use the basis of the printed circulars, but suit themselves about maintaining it.

There is no difficulty whatever at the present time in securing all the coal required, at the opening or spring prices. Quite a tonnage is being moved by individuals, and it is alleged that one or more of the large companies are announcing prompt shipments on orders at the April figures. This condition however, is no different from normal years, excepting that possibly the market broke a little earlier, owing to the open weather which has prevailed most of the winter season.

Production continues on about a 50 per cent. basis, and it is understood some of the larger companies are disposing of part of their output by forwarding it to the Lakes for transshipment. Vessels have been chartered to load this coal, holding it until navigation opens. In this way, it is possible to operate a greater length of time than the local and tide-water demand would warrant.

Broken and buckwheat still continue short.

Bituminous—There is little to be said regarding bituminous. The market shows no disposition to improve, either in demand or prices, and the efforts of salesmen are concentrated on renewing old contracts.

BALTIMORE

Winter's close is marked by extreme dullness. No longer any doubt as to cutting on contracts.

A period of great dullness marks the closing days of winter. The demand for coal in the mining districts is at a minimum and prices are very poor on what spot business develops. Through western Maryland and in West Virginia there are offerings of low grade steam coals down as low as 80c., and much of this is at less than actual production cost. Even the high grade fuels are offering at from \$1.15 to \$1.25. The situation in Pennsylvania is about the same on the best coals, although the lower grades as a rule hold ten cents higher than the same grades from neighboring states.

In some cases there has been a cut of five and ten cents on new contracts, even on good fuels. Producers are showing more than usual anxiety to get under cover but there are some who say that there will be regrets later when business is more brisk. It must be admitted, however, that the early summer will be dull from an industrial viewpoint.

The foreign business is the only thing to hold up well at this port. Six more export charters were announced closed the past week for loading here.

HAMPTON ROADS

Dumpings continue fair. Number of small cargoes move to South American and West Indian ports. Supply at the piers still above normal.

Dumpings over the tidewater piers for the week may be called about fair. There have been some large shipments coastwise to New England and some few small ones south but the movement has not been as heavy as under normal conditions. Export cargoes have been made to a number of different ports in South America and West Indies and although the number of vessels has been fair the cargoes, with one or two exceptions, have been very small and the total coal exported was not large. The number of bunker steamers has not been as heavy as anticipated although this business has held up remarkably well when the war conditions are taken into consideration.

The supply of coal at all piers is still somewhat in excess of normal. It is expected that a considerable part of this will be shipped during the coming week as a number of coastwise vessels are due for cargoes and the government will probably take some coal. Practically no high volatile coal was moved during the week, although there have been some small shipments of nut and slack New River and Pocahontas in addition to the mine-run.

There appears to be no change in prices at tidewater on the grades of coal shipped through here, although it is understood that April contract prices are now being quoted on March business.

The following cargoes cleared from Hampton Roads ports, between Mar. 5 and Mar. 12, inclusive:

Norfolk			Newport News		
Vessel	Tons	Destination	Vessel	Tons	Destination
Talisman	2400	Port au Spain	Sif	4637	Fort de France
Josey	3378	Havana	Hamborn	1550	Georgetown
Tabar	5400	Canal Zone	Josef Frerick	2940	Cienfuegos
Magnus Manson	2399	Pernambuco	Nora	5169	Montevideo
Frankrig	2181	Barbados	Parana	5800	Brazilian ports
A. M. Davenport	1718	Para			
Falk	1169	Manzanillo			
Denis	2050	Para			
Tottenham	4579	Curacao			
Batque Otrud	2186	Genoa			

Note—Steamers are indicated by **bold face type**, all other being schooners.

OCEAN CHARTERS

Coal charters have been reported by the "Journal of Commerce" as follows:

Vessel	Nationality	From	To	Tons	Rate
Ubbergen	Dutch	Baltimore	Tela and Truxillo	1150	
Camilla	Norwegian	Baltimore	Bocas del Toro	1530	
Ruth B. Cobb		Baltimore	Kingston	530	\$3.10
Lydia M. Deering		Philadelphia	Porto Rico	1063	
William H. Clifford		Philadelphia	Porto Rico	1378	2.60
Billster	British	Baltimore	Savona	2790	
Rebecca Palmer		Norfolk	Rio Janeiro	2125	6.50
Dorothy Palmer		Norfolk	Rio Janeiro	2125	
Andrea (ship)	Italian	Philadelphia	Italy	1619	
Doris (bark)	Italian	Philadelphia	Italy	1296	
Chas. Noble Simmons		Baltimore	Kingston	716	
Elizabeth T. Doyle		Norfolk	Para	660	5.50
Orleans		Norfolk	Brazil	605	
Edw. J. Lawrence		Philadelphia	Guantanamo	2483	2.50
Antioch	British	Baltimore	Marseilles	1477	10.32
Henry S. Little		Atlantic range	Guantanamo	984	2.75
F. & T. Lupton		Atlantic range	Guantanamo	797	

Note—Steamers are indicated by **bold face type**, all others being schooners.

OCEAN FREIGHTS

Some new record high rates quoted. Heavy tonnage moving to Italy. Steamers scarce and owners showing little interest in coal charters.

The market has again advanced. A British steamer of 6500 tons coal capacity, has been chartered for three trips from Virginia to the West Coast of Italy, at or about \$10.54, steamer to load the first cargo in April; \$13.44 is bid on grain to the West Coast of Italy for March loading and \$12.72 for April loading, and owners are not inclined to take coal at much less than these figures, as the cost and dispatch for loading and discharging grain are about the same as coal and the charters are cleaner.

A large amount of coal is being moved to Italian and other Mediterranean ports, but shippers have been obliged to charter steamers on time charter to transport same, either for round voyages or for periods.

Rates from the Plate are easier and consequently outward rates firmer. Very few steamers are available for Cuban and West Indian trades as the bulk of these boats have been absorbed for other business.

Coal freights by steamers are about as follows:

To	Rate	To	Rate
Havana	\$2 50@2.75	Guantanamo	\$3.00@3.25
Cardenas or Sagua	3 25@3.50	Demerara	5 50@6.00
Cienfuegos	3 00	Bermuda	3 00@3.75
Port au Spain, Trinidad	3 50	Vera Cruz	3 50
St. Lucia	3 50	Tampico	3 50
St. Thomas	3 25	Rio	10 80
Barbados	3 50	Montevideo, Buenos	
Kingston	3 00@3.25	Aires or La Plata	10 20
Curacao	3 25	Mediterranean	12 48
Santiago	3 00@3.25	Valparaiso	8 40@9.60

Note—Rates noted in **bold face type** are only approximate.
W. W. Battie & Co.'s Coal Trade Freight Report.

OHIO VALLEY

PITTSBURGH

Supplies far in excess of demand and prompt market softer than ever, affecting the annual contracting movement, which is proceeding very slowly and at prices 10@15c. below those of a year ago.

The situation as to the volume of free coal offered and prices is the worst for many weeks. Perhaps on account of the sharp decrease in domestic demand, or perhaps on account of operators having expected altogether too much in the way of general demand, the relation between supply and demand is more out of balance than for a long time. Production is at the rate of 60% of capacity, perhaps a trifle more, while the demand is 10 or 20% under this and the natural result is price demoralization.

As a temporary condition, to be righted by the action of natural trade laws, the situation need not be considered so extremely regrettable, but it chances that this is the annual

contracting period, and the influence of the spot market upon contracting has been disastrous. Sellers as well as buyers realize that this is strictly a buyers' market. The result is that what contracting is done, is on a basis 10 to 15c. lower than a year ago and some buyers are so affected that they do not take advantage of the fact that it is a buyers' market, and refrain from participating at all. Their policy apparently is to buy in the prompt market for a time, expecting to take to cover under contracts should appearances of returning strength develop. On contracts for the twelvemonth to Apr. 1, 1916, the usual asking prices are 80@90c. for slack and \$1.10 @1.15 on mine-run, but some desirable contracts have been closed at less than these figures.

While the situation is on the whole unsatisfactory from all viewpoints, one large interest reports that since Jan. 1 it has booked a slightly larger volume of contract business than in the same period a year ago. Prompt prices are scarcely quotable. Slack, of course, is higher for prompt than on contract, as contracts would run through the Lake shipping season, when slack is particularly plentiful. Free mine-run is readily offered at \$1.05 and \$1.10, but has sold at considerably less, and probably in a number of instances at under a dollar. We quote the following as about the higher prices obtainable for free coal, under favorable conditions: Slack, 90c@\$.1; nut and slack, 95c.@\$1.05; nut, \$1.05@1.10; mine-run, \$1.05@1.10; ¼-in., \$1.15@1.20; 1¼-in., \$1.25@1.30, per net ton at mine, Pittsburgh district.

No prices for Lake coal for the season have been named, but some of the operators may make a start at naming quotations within a week or ten days. It is the universal opinion that shipments will be light in the fore part of the season, but there are many who expect a fairly large movement late in the season, based upon stocking up against a mining suspension a year hence when both the anthracite and bituminous scales expire. One prediction is made that Lake shipments will be 25,000,000 tons, against 23,000,000 tons a year ago, but such an estimate would not be sanctioned in all quarters.

TOLEDO

Betterment in the rural demand for anthracite and Pocahontas coal. Slack is strengthening. Navigation to open early.

A slight strengthening in slack market is the only change noticeable in the Toledo coal market. Prices are down to bed-rock with little prospect of improvement until conditions change. There has been some activity during the past week or ten days in the Pocahontas and anthracite demand from the rural districts. Prospects are good for an early opening of navigation. Railroads are buying but little coal. Considerable interest is being expressed in the coal rate problem which is now before the Ohio legislators.

COLUMBUS

Trade still quiet in the extreme. Both the domestic and steam trade are slow. Uncertainty surrounds the Lake trade. Prices are rather low all along the line.

Domestic demand is weaker than a week ago, which coupled with a slack demand for steam sizes caused a quiet market all around. There is little hope for immediate improvement and future prospects are not encouraging. Dealers are reducing their stocks and not buying any more than is necessary to tide them through. Retail business is necessarily slow because of the warm weather. Reports from traveling salesmen show that retail stocks are rather low. Pocahontas and West Virginia splints appear to be in the best demand from the retail trade.

Steam business is still slow and there are no signs of improvement. Railroads are taking a fair amount of fuel but manufacturing establishments are not buying to any extent. Contracts are not being renewed as most of the factories are purchasing in the open market. What few contracts have been closed have been at a sacrifice of profits generally. Production is at the lowest point in weeks. It is estimated that the Hocking Valley only produced about 20% of normal and the same figures are given for Crooksville, Cambridge and Jackson fields. In the Pomeroy Bend field the output is estimated at 35% or lower.

The Lake trade is a thing of considerable uncertainty. Docks of the Upper Lake ports apparently have a good surplus and it is believed the season will be late in opening. Chartering of boats is not active and only a small amount of coal has been loaded.

Prices in the Ohio fields are:

	Hocking Valley	Pomeroy	Kanawha
Rescreened lump	\$1.45	\$1.50	.....
Inch and a quarter	1.30	1.35	\$1.30
Three-quarter inch	1.25	1.30	1.25
Nut	1.15	1.25	1.15
Mine-run	1.05	1.10	1.05
Nut, pen and slack	0.65	0.70	0.60
Coarse slack	0.55	0.60	0.50

CLEVELAND

Coarse coals have been cleaned up for the first time in several weeks and the market is generally stronger. The retail trade is doing a fair spring business, filling out domestic stocks for spring use.

Operators who have been sending a large tonnage of three-quarter coal into the Cleveland market on consignment have very much curtailed their shipments the last week and the local market is without coarse coal except that brought in on contract. One of the worst offenders has announced that henceforth its mines will be closed two to three days a week until there is a real demand for three-quarter coal. The smaller shipments of the last two weeks and the fact that all spot stocks have been cleaned up, sent the price of West Virginia No. 8 three-quarter to \$1.85 to \$1.90 on track for immediate delivery. The undertone of the coarse coal market is weak, but it will continue strong enough to bring these prices if consignment coal is kept off the market.

Fine coal also is in better shape. There is very little free coal coming into this market and brokers are able to get a fair price. Middle district slack has been selling for \$1.70 to \$1.75 and Fairmount at \$1.80 on the spot market.

Only 230 cars of coal came in over Sunday and the trade was in position to take this without difficulty. This seems to be about the absorbing power of the trade at the present time. Although the market is very narrow shipments of the last week have been light enough to keep prices on a profitable basis, at which they will continue unless something breaks loose as has so often happened the last few months.

The weather has been against the retail trade, but not warm enough to do without furnace fires. Domestic consumers are running low and orders for half-ton to two-ton deliveries are rather plentiful; but it takes a good many to make a day's business, and there are not enough such orders to help the wholesale market for domestic coals.

Quotations for shipment are as follows:

	Pocahontas	Youghiogheny	Bergholz	Fairmont	W. Va. No. 8
Lump.....	\$3.05	.....	.....	.....	.....
Lump, 6 in.....	.....	.....	\$2.30	.....	.....
Lump, 1 1/2 in.....	.....	\$2.35	2.10	.....	.....
Lump, 1 in.....	.....	2.20	2.00	\$1.90	\$1.90@2.00
Egg, 6 in.....	3.15@3.20	.....	.....	.....	.....
Egg, 6 in.....	.....	1.95	.....	1.80	1.75@1.90
Mine run.....	2.45@2.50	2.10	1.90	1.80	1.75@1.90
Slack.....	.....	1.90	1.80	1.90	.....

CINCINNATI

Business on a summer basis, though there is a better demand for steam grades. Domestic coal is not moving at all.

With the cessation in the demand for the prepared grades a stimulation of the steam market has resulted, forming the only factor of an encouraging nature in the trade. This is due to the small production of screenings, and the resulting scarcity of that grade. Mine-run has also participated in the rise, although it is not at a premium. A slight improvement in the demand, caused by a better feeling in manufacturing and industrial circles, has accentuated this phase of the situation.

BIRMINGHAM

Steam coal practically the same, with no evidence of immediate improvement. Lump coal very quiet.

Steam coal has about held its own, though no great improvement has been noted; prices remain the same and inquiries are few and far apart. Shipments this month are about the same as last month. Lump coal shows no life whatever, and many mines have coal on demurrage which they are selling at far less than the regular price. No improvement is now anticipated in this branch, until later on in the summer and early fall, unless conditions change unexpectedly. Blacksmith coal, while falling off slightly in tonnage, continues at the same price, and producers have little cause for complaint.

LOUISVILLE

Situation developing into the worst in years. Operations heavily curtailed with many mines closed entirely.

Operators and dealers in touch with the Kentucky coal market use such words as "desperate" and phrases such as "worst since '93" to describe the state of affairs. Operations at the rate of one and two days a week are the rule, with a few exceptions, while there are many mines, in both the Eastern and Western fields, which have closed down altogether.

Domestic sizes are very heavy, due to the balmy weather, large overstocks in retailers' hands and an enormous amount of coal on the river. Steam coals are somewhat firmer. Prices asked for block coals range from \$1.25 to \$1.50, while nut and slack is offered at from 60 to 75c. These are for the best grades of coal f.o.b. mines.

COKE

CONNELLVILLE

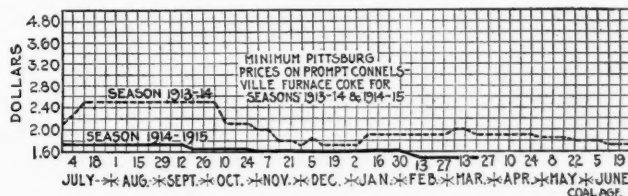
Market stagnant and prices largely nominal. Consumption increased of late, but no increase in production and shipments in the week.

There are no new features in the situation. Consumption of coke in general has increased further, but merely by the blowing in of blast furnaces by steel interests and thus not increasing the demand for merchant coke. Prices quoted are necessarily largely nominal, but there is practically no doubt that coke of standard brand could be bought at the figures named: Prompt furnace, \$1.50; contract furnace to July 1, \$1.60; contract furnace to Jan. 1, \$1.75; prompt foundry, \$2@2.20; contract foundry, \$2.15@2.30, per net ton at oven.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Mar. 6 at 274,652 tons, a decrease of 283 tons, and shipments at 274,104 tons, a decrease of 4357 tons.

Buffalo—There is no stir in the trade. Iron furnaces are running at a moderate rate, with not much prospect of an early increase of output. There is more building in iron and steel than formerly and with a fair activity in that line alone the furnaces will soon need to run stronger. All prediction as to what will be needed in Europe has been dropped. Prices are still very low, on the basis of \$4.25 for best 72-hr. Connellsville foundry and \$3.30 for stock coke.

Chicago—Furnace and foundry coke remain unchanged with slow demand. Domestic coke is being quoted freely at April prices. Prices are as follows: Byproduct, \$4.45@4.75; Connellsville, \$4.65@4.80; Wise County 72-hr. (select), \$4.50@4.75; gas coke, \$4@4.10; furnace, \$4.40@4.65.



THE STEEL INDUSTRY

Situation quiet but generally encouraging. Buying far ahead on war orders.

While March thus far has put new business on the books of most steel companies at a somewhat less rate than that of February, the scale of mill operations has been encouraging. For the whole industry it is around 60% and for a part of last week the Steel Corporation's steel ingot output was above 69%.

On certain products it is evident that the buying since the first of the year was in compensation for the remarkable stagnation in the closing months of 1914, but elsewhere there are indications of activity of a broader and more hopeful character. This is noticeable in construction lines and in the unusual business on hand at shipyards.

Trade due to the war is increasing and some of the European governments, in their negotiations here, appear to be looking months ahead. France must get much of her steel from the United States. There may be some exaggeration of the extent to which iron and steel and metal-working operations are based upon war demand; but in machine tools, particularly lathes and all turning machines, the purchases for Europe have turned depression into prosperity for many concerns. Six months' orders in these lines have run into many millions of dollars.

The signs of new buying in view of the approach of the open season are not numerous, but structural work is growing and the implement works are making larger demands upon bar mills.—"The Iron Age."

MIDDLE WESTERN

CHICAGO

Demand for domestic coal stagnant. Screenings high priced with output limited. Smokeless and splint coals weak.

There is but little stir in the markets at present, and conditions are fully as depressed as they have been for a number of weeks past. With the exception of screenings, it is difficult to move coal at any price, and in numerous cases the trade is

quoting April figures for March shipment. This is particularly true of smokeless, splint and independent anthracite shippers and even these quotations have not stimulated business. There is some lessening of coal on tracks.

Screenings from all districts still continue their upward trend. Very little fine coal is left at the mines, and the general reduction in output causes a corresponding decline in the production of screenings. As a result, the supply is hardly equal to the demand, and predictions are made that still higher prices will prevail, because there is no prospect of any betterment in the demand for the coarser sizes in the immediate future. Steam users have been little inclined to renew contracts, but now that screenings are stronger, they may evince more of a disposition to commit themselves.

An increased number of Indiana and Illinois mines have been closed down for the summer months, and this action should have a stimulating effect later. The dealers still continue to carry minimum stocks, and the retail demand is quite light.

Smokeless coals are quite dull, and little business is being placed with contracts hardly being considered. It is felt that Lake business will not be inaugurated until some time in July.

In splints there has been some recovery, the demurrage coal having been absorbed.

Eastern Kentucky fuels are in a bad way, and a considerable tonnage has been sold at sacrifice prices.

The coarser sizes from Franklin and Williamson County are steady, in view of general market conditions, although shipments are light; screenings from these districts have advanced very rapidly, having sold as high as \$1.05 per ton.

The situation in the Springfield district is dull except in screenings, which show a marked bullish tendency.

The curtailment in production of the Indiana mines is notable. Screenings from this section have not advanced so rapidly as from other districts, but are held at fairly good figures.

Prevailing prices are as follows:

	Williamson and Franklin Cos.	Springfield	Sullivan	Clinton	Carterville
Lump.....	\$1.25@1.50	\$1.30@1.40	.....	\$1.30@1.40	\$1.40@1.75
4-in. lump.....	.....	.....	\$1.40@1.75	.....	.....
Steam lump.....	.....	.....	1.25@1.35	1.20@1.35	.....
2 1/2-in. lump.....	.....	.....	1.35@1.50	.....	.....
1 1/2-in. lump.....	.....	.....	1.20@1.35	1.20@1.35	.....
Mine-run.....	1.05@1.20	1.00@1.05	1.00@1.10	0.95@1.10	.....
Egg.....	1.25@1.40	1.30@1.40	1.20@1.30	1.15@1.30	.....
No. 1 washed.....	1.20@1.50	.....	.....	.....	1.50@1.65
No. 2 washed.....	1.20@1.40	.....	.....	.....	1.40@1.50
6x3-in. egg.....	.....	.....	.....	.....	1.50@1.65
Nut.....	.....	1.15@1.25	1.10@1.25	1.10@1.20	.....
No. 1 nut.....	1.35@1.50	.....	.....	.....	.....
No. 2 nut.....	1.25@1.35	.....	.....	.....	.....
Screenings.....	0.85@1.00	0.80@0.95	0.80@0.95	0.85@0.95	0.90@1.00

	Saline Co.	E. Kentucky	Poca.	Somerset	Hocking
Lump.....	\$1.30@1.40	\$1.10@1.40	\$1.50@1.75	\$1.50@1.75	.....
1 1/2-in. lump.....	.....	.....	.....	.....	\$1.15@1.40
Mine-run.....	1.05@1.15	1.15@1.25	1.00@1.40	1.00@1.10	0.90@1.15
Egg.....	1.30@1.40	1.00@1.10	1.50@1.75	1.50@1.75	.....
No. 1 nut.....	.....	.....	.....	.....	.....
No. 2 nut.....	1.25@1.35	.....	.....	.....	.....
Screenings.....	0.85@0.95	.....	.....	.....	.....

Knox and Greene County 5-in. lump, \$1.35@1.50; 3-in. lump, \$1.20@1.30; 5-in. egg, \$1.20@1.30; 3-in. egg, \$1.15@1.25; mine-run, \$1@1.10; screenings, 80@95c.

ST. LOUIS

Longest mid-winter season of low prices in the history of the trade. Shortage of steam sizes. Mine operations heavily restricted. Manufacturing demand slowing up.

The past week has been another of unparalleled depression, making one of the longest low-priced periods for the mid-winter season in the history of the local coal trade. The only demand at the present time is for steam coal, which is strong for the smaller sizes from all fields; this is due to the fact that the tonnage of coal produced has fallen off remarkably in the last few weeks because of the light demand for the larger sizes. Thus, in spite of an unusually small demand for steam coal the price for screenings is at the top notch. With very little indication of any colder weather coming from now on, a strong steam market can be anticipated for the coming few months.

In the southern Illinois field, mines are working two days a week, with a maximum of three, and in some instances several mines have suspended operations altogether.

In the washed sizes, Nos. 3, 4 and 5 are in good demand, while Nos. 1 and 2 are heavy. Lump and egg from the high grade fields are going at the buyer's figure, and in Standard field there is no difference in the price of 2-in. lump and mine-run. The country demand for all grades of coal is remarkably light, and there has been a general falling off in manufacturing lines for the past few weeks that has been quite noticeable.

There is no anthracite moving in at all to speak of, and an unusual tonnage of West Virginia smokeless is under demurrage at East St. Louis, rejected on account of weather conditions.

INDIANAPOLIS

Screenings decidedly stiffer because of the curtailed supply. Otherwise the market is heavy and operations severely restricted.

March weather continues spring-like and the coal industry lags. The only feature of interest is the stiffer prices on screenings, 90c. being obtainable for good grades. Yards are buying domestic grades as they need the coal and will follow that policy until the end of the season, as they carry no Indiana coal during the spring and summer months. There continues to be a slight improvement in industrial conditions, which makes a better movement of steam grades, though this is so small that it takes the accumulation of several weeks to show there is material advance. Mines are making half-time or a little better. Consumers will expect the usual price reductions Apr. 1, but it is doubtful if there will be any at the mines.

PRODUCTION AND TRANSPORTATION STATISTICS

NORFOLK & WESTERN RY.

The following is a statement of coal handled by the N. & W. Ry. during February and the past four months in short tons:

	November	December	January	February
Pocahontas Field.....	837,577	798,182	912,682	835,826
Tug River District.....	253,975	227,944	298,766	243,910
Thacker District.....	235,080	227,938	257,580	195,557
Kenova District.....	90,772	90,030	98,422	67,667
Clinch Valley District....	237,831	135,362	169,581	129,193
Other N. & W. Territory	3,849	1,686	3,769	1,785
Total N. & W. Fields..	1,659,084	1,481,142	1,740,800	1,473,938
Williamson & Pond Creek	62,505	62,271	58,296	58,101
R.R.....	131,269	97,752	87,842	88,982
All other railroads.....	.....	.....	.....	.....
Grand total.....	1,852,858	1,641,165	1,886,938	1,621,021

FOREIGN MARKETS

GREAT BRITAIN

Exports restricted because of the acute shortage in the local markets. Efforts to keep prices down.

London, Mar. 5—The coal industry remains in the abnormal condition which the effects of the war have brought about. Despite the restricted exports, the demand on every hand is now exceeding the supply, and prices of nearly all qualities are at a very high level, while some are still advancing. Considerable interest has been aroused by the remarks of Sir Arthur Markham in the House of Commons concerning the increase in the cost of production, and the subsequent undertaking of the Yorkshire collieries with which he is connected to charge no more than \$3.60 per ton at the pit. Meanwhile the report of the Retail Coal Inquiry, which has just commenced its proceedings, is expected to be issued with as little delay as possible, and is awaited with interest.—"The Iron & Coal Trade Review."

Mar. 4—The situation grows worse. Holders of free coal (and there is very little available) can practically make their own price. For April shipment no business is being done, buyers holding for cheaper prices, and sellers anticipating a further rise. Quotations are approximately as follows:

Best Welsh steam.....	\$7.20	Best Monmouthshires.....	\$6.00
Best seconds.....	6.72	Seconds.....	5.76
Seconds.....	6.24	Best Cardiff smalls.....	4.80
Best dry coals.....	5.25	Cargo smalls.....	4.32

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport both net, exclusive of wharfage.

Freights—Tonnage is in great demand, and is very scarce, owing mainly to Admiralty requirements. Rates are approximately as follows:

Gibraltar.....	\$5.28	Naples.....	\$8.16	Las Palmas.....	\$5.04
Malta.....	.....	Venice, Ancona.....	10.20	St. Vincent.....	5.28
Marseilles.....	6.19	Alexandria.....	8.16	Rio Janeiro.....	7.80
Algiers.....	7.20	Port Said.....	7.20	Monte Video.....	6.96
Genoa.....	7.92	.....	.....	River Plate.....	7.20

Note—These quotations are based on an exchange rate of one shilling equals 24 cents.

Coal Contracts Pending

As the result of an investigation into numerous complaints regarding a number of contract items emanating from a certain apparently authoritative source, it has been found that many of these were grossly misleading and others only partially correct. This particular source of information has been eliminated and a more rigid censorship established throughout the department to avoid a recurrence of such an incident.

We wish to take this occasion to extend thanks for the many kindly criticisms which led up to this disclosure, and also to remind our readers that in a number of specific cases, the information printed in these columns was entirely correct even though an energetic denial was made by the prospective purchaser. All coal salesmen are familiar with certain types of negotiations, conducted through underground channels and shrouded in an impenetrable mystery which will not stand the light of publicity. It is to be expected that the announcement of such transactions will be regarded with a certain disfavor, if not open resentment. We do not believe this to be in accord with the accepted business principles of today—a conclusion in which we have been sustained by the more thoughtful and conservative members of the coal industry.

We propose to build this department into one of the most authentic and valuable features of our paper. Your kindly cooperation is invited.

No. 189—Bristol, Conn.—The Bristol & Plainville Ry. Co. states that it is not in the market for any coal at the present time (p. 399). Address Agt. E. Cockings, Bristol & Plainville Ry. Co., Bristol, Conn.

No. 226—Portland, Ore.—Bids on this contract (p. 446) involving 2000 tons of steam coal will be received until Mar. 31 and awards made Apr. 15 or May 6. Address Chief Clerk, Board of Education, 401 Court House, Portland, Ore.

No. 242—Rutland, Vt.—This contract (p. 447) provides for an annual tonnage of 150,000 to 200,000 gross tons of bituminous coal, delivery of approximately one-half to be made at Norwood, N. Y., and the balance at Rotterdam Junction, N. Y. For shipment beyond, the Rutland R.R. Co. is to have the privilege of accepting its requirements for delivery at either point without accepting the proposition as a whole. The car supply for at least the tonnage to be shipped to Rotterdam Junction to be furnished by the Rutland R.R. Co. Should the bidder not wish to quote for delivery at Rotterdam Junction and Norwood, the proposition will be accepted for delivery f.o.b. mine; but should the proposition be made on this basis, the bidder should give the freight rate from the mine to Norwood and Rotterdam. Address Pur. Agt. James E. Kilborn, Rutland R.R. Co., Rutland, Vt.

No. 258—Albany, N. Y.—Sealed proposals will be received until noon, Mar. 24, for supplying various state institutions with coal for one year beginning Apr. 1, 1915 (p. 447). Address Agt. and Warden Thomas Mott Osborne, Sing Sing Prison, Ossining, N. Y.; Agt. and Warden Charles F. Rattigan, Auburn Prison, Auburn, N. Y.; Agt. and Warden William J. Homer, Great Meadow Prison, Comstock, N. Y.; Agt. and Warden John B. Trombly, Clinton Prison, Dannemora, N. Y.; Medical Supt. R. F. C. Kieb, Matteawan State Hospital, Beacon, N. Y.; Medical Supt. Charles H. North, Dannemora State Hospital, Dannemora, N. Y.

No. 268—Buffalo, N. Y.—Bids on this contract (p. 448) were not opened until Mar. 19 instead of Mar. 15 as previously announced. Address Clerk of the Board, Board of Police Commissioners, Headquarters Bldg., Franklin and Seneca St., Buffalo, N. Y.

No. 295—Danville, Penn.—Bids will be received until Mar. 29 for furnishing the State Hospital for the Insane with

10,000 tons of No. 1 buckwheat, 500 tons of egg, and 100 tons of chestnut (p. 487). Deliveries are to be made as ordered at the hospital coal dump, between Apr. 1, 1915 and Mar. 31, 1916, and the coal must be free from slate and dirt, freshly mined and of the best quality. Address Steward H. B. Schultz, State Hospital for the Insane, Danville, Penn.

No. 296—Leavenworth, Kan.—Bids will be received until noon, Mar. 20, for furnishing coal for the county court house, county jail, county hospital, and for the poor of the county (p. 488). Address County Clk. J. E. Voorhees, County Clerk's Office, Leavenworth, Kan.

No. 301—Housatonic, Mass.—The Monument Mills Co. advises that it is not in the market for coal as noted in a previous issue (p. 488). Address Treas. Jno. H. C. Church, Monument Mills, Housatonic, Mass.

No. 319—Lowell, Mass.—The Lowell Hosiery Co. will be in the market for 1100 tons of bituminous coal about Apr. 1, delivery via B. & M. R.R. Address Pur. Agt. E. A. Thissell, Lowell Hosiery Co., Lowell, Mass.

No. 320—Clarion, Iowa.—The Clarion Light Plant will be in the market during April for 1000 tons of ¾-in. Christopher Illinois screenings, the present contract price being \$3.26, delivered in bin. Address G. Mack, Clarion Light Plant, Clarion, Iowa.

No. 321—Indiana and Ohio.—The Cincinnati, Hamilton & Dayton R.R. Co. is in the market for coal for its different coaling stations at Morefield, Montezuma, and Connersville, Ind., and Hamilton, Ohio. This company requires approximately 200 tons of mine-run lump or other grades of coal suitable for locomotives per day. Address Fuel Agt. E. E. Foos, Cincinnati, Hamilton & Dayton R.R. Co., Baltimore, Md.

No. 322—Providence, R. I.—The Brown & Sharpe Mfg. Co. will be in the market about Apr. 1 for 10,000 tons of anthracite and bituminous coal. Address Brown & Sharpe Mfg. Co., Providence, R. I.

No. 323—Indianapolis, Ind.—The Artificial Ice & Cold Storage Co. at this place will contract about Apr. 1 for their coal supply. This company generally consumes about 150 tons of No. 6 Indiana screenings for steam purposes per week. Address Treasurer, Artificial Ice & Cold Storage Co., Indianapolis, Ind.

No. 324—Buffalo, N. Y.—Bids were received until noon, Mar. 16, for furnishing 2000 tons of anthracite and bituminous coal for the 65th Regiment, National Guard. Address County Treasurer's Office, Buffalo, N. Y.

No. 325—South Whitley, Ind.—The Grip Nut Co. at this place is in the market for 1500 to 2000 tons of mine-run coal per year, the previous contract having expired Dec. 1, 1914. Quotations for this supply should be made f.o.b. South Bend, Ind. Address Purchasing Agent, Grip Nut Co., South Bend, Ind.

No. 326—Cheboygan, Mich.—Sealed bids will be received until Apr. 6, for furnishing about 1700 tons of Pennsylvania lump and Michigan 1¼-in. steam lump coal at the Water Works. Address City Clerk, Cheboygan, Mich.

No. 327—Pine Bluff, Ark.—The Pine Bluff Co. at this place will soon be in the market for about 11,000 tons of Arkansas slack coal, the usual price being \$2.10 per ton. Address the Pine Bluff Co., Pine Bluff, Ark.

No. 328—Vinton, Iowa.—The Municipal Electric Light & Power Plant at this place will soon be in the market for about 3500 tons of washed nut southern Illinois coal, the present contract being closed at \$3.19 per ton. Address Supt. W. E. Klingam, Vinton, Iowa.

No. 329—New Castle, Ind.—The contract with the Maxwell New Castle Mfg. Co. for screenings for steam purposes will expire on Apr. 1. Address Gen. Mgr. W. G. Jameson, Maxwell New Castle Mfg. Co., New Castle, Ind.

No. 330—Moline, Ill.—The Republic Iron & Steel Co. will be in the market for approximately 600 tons of screenings, 100 tons of 1¼-in. lump, and 100 tons of nut coal per week, about Apr. 1. Address Purchasing Agent, Moline Iron & Steel Co., Moline, Ill.

No. 331—Springfield, Mass.—The City of Springfield will contract for from 8000 to 10,000 tons of anthracite and bituminous coal about Apr. 1, deliveries via B. & A. R.R. and N. Y.

N. H. & H. R.R. and by wagon. Address Municipal Department, Springfield, Mass.

No. 332—Buffalo, N. Y.—Sealed proposals will be received until noon, Mar. 20, for supplying 35,000 tons of $\frac{3}{4}$ -in. slack coal and 1000 tons of mine-run coal for the Hamburg-Canal Pumping Station. Address Comr. Col. Francis G. Ward, Department of Public Works, Buffalo, N. Y.

No. 333—Loudonville, Ohio—Bids were received up to noon Mar. 15 for furnishing 1200 tons of mine-run coal to the local light plant. Address Clk. John Deyarmon, Board of Trustees of Public Affairs, Loudonville, Ohio.

No. 334—Jersey City, N. J.—Bids were received up to 8 p.m. Mar. 17 for supplying the public schools with anthracite coal for a period beginning Apr. 1, 1915, and ending Mar. 31, 1916. Address the Secretary, Board of Education, Jersey City, N. J.

No. 335—Terre Haute, Ind.—The Board of Education at this place will be in the market probably during April for approximately 4500 tons of $1\frac{1}{4}$ -in. No. 4 vein soft coal. The present contract price is \$2.08 per ton. Address Board of Trustees, Terre Haute, Ind.

No. 336—Albany, N. Y.—The Board of Education will contract either in April or May for about 5000 tons of egg, chestnut and stove coal, the usual cost per ton being about \$5.55. Address Board of Contract & Supply, City Hall, Albany, N. Y.

No. 337—Cedartown, Ga.—The Water & Light Department will soon be in the market for about 2400 tons of bituminous coal. This contract is awarded on a test basis as well as by cost per ton. Address Supt. W. T. Hardy, Water & Light Dept., Cedartown, Ga.

No. 338—Central City, Neb.—The Central City Light & Water Works will be in the market about Apr. 1 for approximately 1500 tons of Rock Springs slack coal, the present contract price being \$3.71 per ton. Address Leonard Anderson, Central City Light & Water Works, Central City, Neb.

No. 339—Warsaw, Ind.—The Winona Electric Co. will soon be in the market for next season's supply of screenings. Address Pres. W. B. Frazer, Winona Electric Co., Warsaw, Ind.

No. 340—Rochester, N. Y.—Bids will be received until noon, Mar. 19, for furnishing the public schools with coal. Address Secy. J. S. Mullan, Board of Education, Municipal Bldg., Rochester, N. Y.

No. 341—Anderson, Ind.—The Patent Vulcanite Roofing Co. will be in the market about Apr. 1 for its coal supply for next season. Address Patent Vulcanite Roofing Co., Anderson, Ind.

No. 342—Albany, N. Y.—Sealed proposals will be received until 2:30 p.m., Mar. 23, for furnishing the various state charitable institutions with coal for a year beginning Apr. 1. The following are the quantities involved:

Institution	Bituminous		Anthracite	
	Grade	Tons	Grade	Tons
Albion	Mine-run	1800	Chestnut	140
Batavia	Mine-run	1200	Stove	35
Bath	Slack	4000 ¹	Stove	400
			Chestnut	100
Bedford	Mine-run	2000	Buckwheat No. 3	14,000 ²
			Stove	690
Elmira	Mine-run	6000	Chestnut	350
			Egg	125
Hudson	Mine-run	3000	Stove	125
			Chestnut	125
Industry	Mine-run	375	Pea	700
			Stove	1,720
Iroquois	Mine-run	1400	Chestnut	455
			Stove	30
Napanock	Mine-run	1300	Chestnut	150
			Stove	225
Newark	Mine-run	4000	Chestnut	35
			Stove	60
Oxford			Chestnut	40
			Buckwheat No. 1	1,640
Randalls Island..	Gas	400	Stove	100
	Slack	900	Pea	300
Ray Brook	Mine-run	2300	Buckwheat No. 3	3,000
			Stove	150
Rome			Stove	350
			Buckwheat No. 1	5,500
Sonyea	Mine-run	2500	Egg	900
			Stove	500
Syracuse	Mine-run	500	Chestnut	1,500
			Pea	3,200
Thiells			Stove	200
			Buckwheat No. 1	2,000
West Haverstraw			Chestnut	500
			Stove	300
Yorktown Heights			Chestnut	30
			Stove	30

¹Or 14,000 gross tons Buckwheat No. 3 (no slack).

²Or 10,000 gross tons Buckwheat No. 3 and 4000 gross tons slack.

Address Purchasing Committee, Rooms 602 and 603, Capitol, Albany, N. Y.

No. 343—Chicago, Ill.—Bids will be received until Mar. 22 for furnishing the Rock Island Lines with its supply of coal, the contract to expire Mar. 31, 1916. The amount required is from 200 to 400 tons of mine-run and lump coal per day. In submitting bids, the following information is requested: Name and location of mine; name of railroad located on; name or number of vein of coal on which bid is based; screen area and size of openings and whether shaker or bar screen; whether coal can be loaded on closed cars; whether bidder has track scales for weighing all grades of coal produced and whether scales are so arranged that empty cars may be weighed. Copy of coal analysis should accompany bid, stating whether taken from face or car sample; also name of person making the analysis and date. Address Fuel Agt. D. B. Sebastian, Rock Island Lines, Chicago, Ill.

No. 344—Attleboro, Mass.—Sealed proposals will be received until noon Mar. 24 for furnishing the city government with coal as follows: No. 1—450 tons of bituminous, delivered in two shipments of 225 tons each, on cars at Attleboro. No. 2—450 tons, delivered in two shipments of 225 tons each in the coal sheds of the Attleboro Water Works Pumping Station. Address Supt. of Pub. Wks. H. J. Goodale, Room 9, Sturdy Block, Attleboro, Mass.

No. 345—Salem, Ohio—Bids were received up to noon Mar. 5 for supplying coal to the water works pumping station for one year, beginning Apr. 1. Bidders were to state whether coal was to be delivered at pumping station or f.o.b. cars Salem, and each bid was to be accompanied with an analysis of the coal proposed and by a certified check for \$200. Address Dir. of Pub. Ser., I. N. Russell, Salem, Ohio.

No. 346—Chicago, Ill.—Sealed proposals will be received until Mar. 20, for supplying steam coal f.o.b. the power house of the Sears, Roebuck & Co., which is located on Homan Ave. alongside the B. & O. C. T. tracks. During the past year this company consumed approximately 45,000 tons of steam coal, and in general it maintains a supply of 3000 tons. Address Pur. Agt. J. H. Westrich, Sears, Roebuck & Co. 925 Homan Ave., Chicago, Ill.

No. 347—Burlington, Iowa—Sealed bids will be received until Mar. 29 for furnishing the municipality with coal for the fiscal year ending Mar. 31, 1916. Address City Clk. Robert Kroppach, Burlington, Iowa.

CONTRACTS AWARDED

Note—Successful bidders are noted in bold face type.

No. 170—Pontiac, Mich.—This contract (p. 399), which provides for furnishing the Pontiac State Hospital with a supply of coal for one year, has been awarded to the **Ohio & Michigan Coal Co.**, Detroit, Mich. The quantity required is as follows: 8000 tons of Pocahontas mine-run; 500 tons of anthracite grate coal; 500 tons of stove coal. Address Steward E. H. Halsey, Pontiac State Hospital, Pontiac, Mich.

No. 214—Grand Junction, Colo.—This contract (p. 446), which provides for furnishing about 7500 tons of bituminous coal, has been awarded to the **Grand Junction Mining & Fuel Co.** Address Gen. Mgr. E. A. Sunderlin, Grand Junction Electric, Gas & Mfg. Co., Grand Junction, Colo.

No. 220—Bennettsville, S. C.—The Bennettsville Electric & Water Plant advises that it has closed its contract (p. 447). Address Mgr. E. C. Morrison, Bennettsville Electric & Water Plant, Bennettsville, S. C.

No. 291—Guantanamo Bay, Cuba—The bids on this contract (p. 487), which provides for furnishing and delivering 10,000 gross tons of navy standard coal at the U. S. Naval Station, Guantanamo, were as follows:

Name of Bidder	Bid	Coal
American Coal Exporting Co.	\$5.61	{ Pocahontas New River
William C. Atwater	{ 5.82 ¹ 6.00 ²	{ Pocahontas
C. G. Blake	5.83	New River
Berwind-White Coal Mining Co.	5.65	New River
Castner, Curran & Bullitt, Inc.	{ 5.82 5.32 ³	{ Pocahontas New River
Chesapeake & Ohio Coal & Coke Co.	6.25	{ Admiralty Navy Standard
Dexter & Carpenter	6.15	Pocahontas
Archibald McNeill & Sons Co.	5.90	New River
Maryland Coal & Coke Co.	5.70	New River
Northern Coal Co.	5.55	New River
New River Coal Co.	6.27	New River
Pocahontas Fuel Co.	5.795	Pocahontas
Smokeless Fuel Co.	6.04	{ Pocahontas New River
Willet & Martin Co.	5.70	New River
Willard Bros.	6.35	New River

¹Loading in foreign vessels. ²Loading in American vessels.

³Awarded contract for 5000 tons, delivery by schooner.